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3D World

THE INTERNATIONAL MAGAZINE FOR 3D ARTISTS

20 YEARS OF CGI TECHNIQUES

FROM TRON TO MONSTERS, INC... HOW AN INDUSTRY WAS MADE, AND WHERE IT'S GOING NEXT

CREATE REALISTIC METAL

Using shading, texture and grunge effects for convincing metallic surfaces

BLACK HAWK DOWN

How Mill Film created the effects for Ridley Scott's latest blockbuster

SYNTHETIC DIMENSIONS

Meet the company that's just created 13 hours of kids' TV – and stayed sane

MENTAL RAY 3.2 FOR MAYA

Does the industry-standard renderer make Maya even better? Full review





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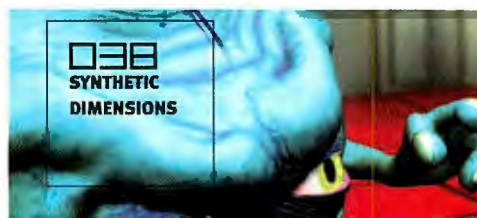
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EDITOR'S PERSPECTIVE

So, 20 years of CGI, eh? Actually that's quite an arbitrary figure; it's more like 40, if you check out the handy-dandy timeline in our cover feature. Nevertheless, it was in 1982 that both *Star Trek II* (with its innovative 'genesis' sequence) and the ground-breaking *Tron* first appeared.

Tron in particular, though not a hit at the time, set the standard for computer film effects in the same way that *Star Wars* set the standard for the continuing generation of vapid, plotless, character-thin 'comic book' movies aimed at 12-year-olds.

Fortunately, CGI seem to have grown up far faster than its audiences. It's no longer necessary for special effects to be in-your-face, ooh-look-what-we-can-do affairs; in fact many are simply invisible in the final product.

Yet despite all the advancement no one's yet come up with a mainstream flick that genuinely tries to be more than a cartoon. Imagine a CGI flick that's as complex, thoughtful and intriguing as, say, a Coen brothers film. Now there's a goal for the next 20 years...



Ed Ricketts
Editor

The critical list

GEORGE CAIRNS teaches students the joys of *Maya* by day; by night his alter-ego produces sci-fi artwork for CCGs.

SIMON DANAHER is a Mac expert who corners the market in 3D-related reviews and tutorials.

PETE DRAPER, a *3ds max* expert, is Orchard Creative Design Group's senior 3D artist and a regular *3D World* contributor.

DAVE OSBORNE is a freelance animation director who

entered the industry in 1987 and has recently finished kids' CGI series *The Cubeez*.

MARK RAMSHAW is a long-standing contributor to many games and design magazines and is a *3D World* mainstay with plenty of features under his belt.

BENJAMIN SMITH is 3D director at Stormfront Digital Pictures, an award-winning studio which specialises in producing animation and visual effects for TV and visitor attractions.

MAT BROOMFIELD has been a journalist for over 10 years. He's a PC specialist with a penchant for creative computing.

STEVE JARRATT Long-standing Future editor and *3D World* contributor, Steve loves his Mac and *LightWave*, as well as Bassett hounds.

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REPRO Phoenix and Colourworks

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3D World is a member of the Audit Bureau of Circulation
Audited sales July–December 2000: 16,543



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The Future Network plc is a public company quoted on the London Stock Exchange (symbol: FNET).

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If you are an up-and-coming artist in 3D and you don't yet have a job with a major studio, we want to speak to you. We want your showreel to go on our CD, a cool collection of pictures and a promise we'll hear from you when you get a job. See the address to write to below.

EXHIBIT YOUR CREATIONS

Supply your images rendered at print resolution (ideally 3,000 pixels wide or high) on CD or Zip disk to the address below. Please note, images resized in *Photoshop* are not of sufficient quality and won't be used. Files under 1.5MB in size can be e-mailed to 3dw.exhibition@futurenet.co.uk. Alternatively, send your print resolution images on CD or Zip disk to: Exhibition, *3D World*, 30 Monmouth Street, Bath BA1 2BW, United Kingdom. Images that are rendered at 500 pixels or smaller will NOT be printed in the magazine.





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» EXHIBITION



02



04

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02

» EXHIBITIONIST



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EXHIBITIONIST

German animator Marc Brink gets busy with *Blender* to create an optimistic eco-friendly vision of the future...

Inspired by a magazine article, German artist Marc Brink downloaded *Blender* and devoted the next year-and-a-half of his spare time to producing *Last Command*, the six-minute animation included on this issue's cover CD. Set in an apocalyptic future state, bereft of life, the film centres on a mechanoid's efforts to keep the last organism on Earth alive: "The idea of *Last Command* is based on the feeling of '80s cold war atomic warfare," Marc explains. "I wanted to say, 'If the world goes down, hey, don't worry, it's not the end, but it will take a long time to get better,' and if the aliens come too late to meet us, maybe they find the head of this robot, see his story and think we've saved the planet. It's some kind of romantic idea."

Citing a mixed bag of non-CG influences, ranging from King Crimson and Clive Barker to gothic churches and old French villages on rainy days, Marc's short also draws heavily on his experience as an oil painter for its clever composition, atmospheric lighting and meticulous modelling and textures, which the artist derived from his own photographs.

"Perhaps my experiences with painting helped me to find colours and moods," Marc explains. "My composition is based on traditional techniques. Also, finding the correct proportions of characters is easier if you're familiar with painting; I think computer animation is painting with a time component, and much more a story than a single picture." In fact, Marc was so smitten by 3D's ability to go beyond the still frame that his last oil painting still stands unfinished in his cellar.

For him, by far the most enjoyable part of making *Last Command* was the process of designing and modelling the actual characters.

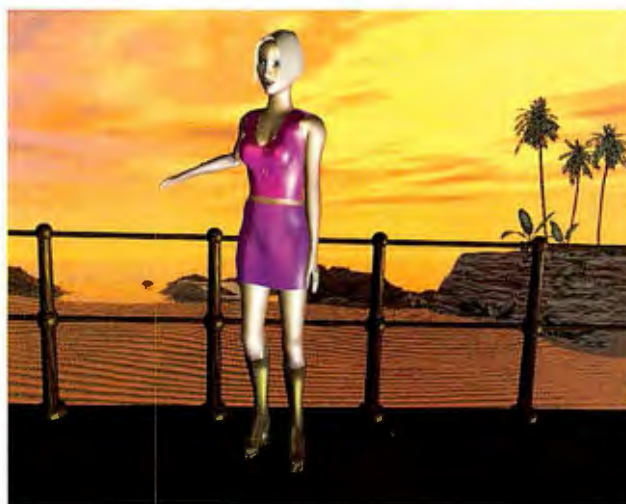
"That was great," he adds. "I really enjoyed building them. It was hard and time-consuming, sure, but by far my finest work. Okay, they're not perfect, but I'm working on it. My goal is to make faces that express everything about the character – feelings, thoughts, their past and

future. That's why I write a short biography of each one, just for my own reference."

He did have a few teething troubles getting to grips with Not a Number's *Blender*, however. "The render engine drove me into madness," he remembers. "Can you imagine leaves and smoke always appearing in front of materials with alpha values? And the new unified renderer which should've fixed this was unable to render correct mist or haze... Another irritant was the inability to render refraction or trace reflections. Oh, and texture-mapping wasn't so good and UV mapping worked only for colour channel... But I have to say the workflow was fine and the object-orientated system a great feature. And at least it was free!"

Marc's persistence eventually paid off, and he's currently starting a new project with more locations and characters than his first animation. He describes it as a surreal dream: "Somebody wakes up, but is still inside his dream. Then a church wakes up and becomes a gigantic knight, and a butterfly dealer who deals with dead people appears..." Disturbing stuff. But how did he manage to maintain his focus on *Last Command* film for a year-and-a-half?

"What kept me going were the little things, like the first cube, the first house, the first head, the first keyframe. And the goal in my mind. Always keep your goal in mind," he advises.



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You'll find *Last Command* on this issue's cover CD.



SEND US YOUR NEWS: 3dw.news@futurenet.co.uk

3dw NEWS

Maya for free

The newly released *Maya Personal Learning Edition* from Alias|Wavefront offers users unlimited access to a non-commercial version of *Maya Complete* – absolutely free

It isn't everyday that an industry-leading program with a price-tag the size of a decent second-hand car is offered to you on a plate, but that's exactly what Alias|Wavefront has done with its 'latest' version of *Maya*, *Maya Personal Learning Edition*.

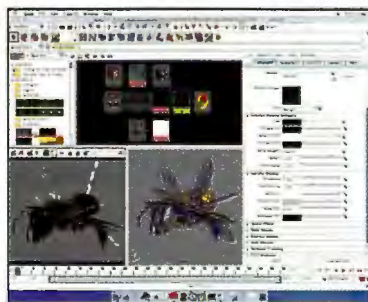
Providing all the features of *Maya Complete* in a non-commercial software package, the company's meritocratic offer has only two conditions: images created using the software are embellished with a watermark and saved in a new non-commercial file format, and users are unable to take advantage of a range of plug-ins.

Access to the program's features is otherwise unrestricted and includes the full NURBS modelling, animation, IK, *Maya Artisan*, *Maya Paint Effects*,

particles, dynamics and rendering. Not only does this new release promise to raise the bar by removing financial barriers, it also qualifies as one of the best computer freebies ever.

Doug Walker, Alias|Wavefront's president, certainly thinks so. "For the first time in history, 3D computer graphics will become truly accessible to everyone," he says. "CG professionals, students and aspiring 3D animators will be able to realise creative aspirations that might otherwise lie dormant. As the leaders in 3D graphics technology, we are excited about engaging a whole new 3D community and equipping them with the tools, skills and support necessary to move ahead in the age of digital communication."

Alias|Wavefront's industry marketing manager Karen Eisen adds that feedback



ABOVE *Maya Personal Learning Edition* is a fully working freely available iteration of the industry standard graphics application which Alias|Wavefront hopes will encourage new talent into the 3D graphics field.

RIGHT & TOP RIGHT Characters from David Kirk's best-selling *Little Miss Spider* books – as modelled in *Maya* for a movie adaptation directed by Diana Walczak and Jeff Kleiser.





from the company's 'A Taste of Maya' programme expressed a widespread desire for a less restricted learning version. "There is no real way to speculate on how the release of *Maya Personal Learning Edition* will affect our position in the market, but we do know that this will open the door to 3D, which is great for everyone," she says. "Just as the decrease of hardware and graphics cards has made CG more accessible, having access to a top-end tool like *Maya* will help level the playing field for people just starting out."

INDUSTRY SHOCKWAVES

The release has real implications for the structure of the industry at entry-level, and Karen believes that over time, the release will noticeably improve the quality of 3D art. "All of a sudden, kids from a very young age will be able to roll up their sleeves and try out the same software that companies like Sony and Disney use," she

everything they need to get up and running and comfortable on *Maya* at their own speed, but it's not a replacement for a formal education," Karen adds. "We partner with various educational institutions and training centres at all levels to ensure that students of *Maya* can find the learning programme that best suits their skill level and learning needs. *Maya Personal Learning Edition* can complement such programs by providing students with an ideal way to improve their skills at home, and in their own time."

So does Alias|Wavefront believe that other companies may follow suit? "We can't speak for the plans of other companies, but we know that this is a highly popular initiative," Karen says. "In the two weeks since our announcement, we've had over 41,000 requests for the download. We're proud to be leading the way in making 3D more accessible to the world."

The software's February release will also be consolidated by a formal *Maya Personal Learning Edition* Web-

based community (see the address below for more information). Resources, learning materials, areas to share work, discussion forums and Tony Hart-esque galleries are all part of the site's mandate.

Maya Personal Learning Edition for Windows and OS X is available now from the site below.

CONTACT: www.aliaswavefront.com/freemaya

what's new

DEBABELIZER PRO 5

Equilibrium has released version 5 of its media management software, *DeBabelizer* for the OS X. The latest version includes improved processing and optimising of stills and QuickTime movies, hot folders for immediate and unlimited batch processing, and advanced colour compression and palette options. *DeBabelizer 5* costs \$469 and is available now. www.equilibrium.com

FREE PLUG-INS FOR CINEMA 4D

Cinema 4D XL users should scoot over to the site below to download bhodinUT's *dirtyNUTS* and *Baker* plug-ins for free. Aside from being completely hilarious, *dirtyNUTS* places dirt, snow, dust and so on in a scene, whereas *Baker* optimises objects for rendering by converting their properties into a single file. The site has stacks of other plug-ins on offer too. www.plugincafe.com

REALVIZ AND OS X

Realviz has announced the availability of its panoramic image creator *Stitcher 3.1* on the Mac OS X for \$199. *ImageModeller* on the OS X will follow later this year. Visit the site below for more info. www.realviz.com

NEW MATERIALS FOR ZBRUSH

Pixologic has released *MaterialPack* and *Material List Zscripts* for *Zbrush*, its renowned Pixel-based 3D painting and sculpting package. The new scripts add 100 new materials and the ability to store them in iconised lists. *Zbrush* users can download the scripts for free at the site below. www.zbrush.com

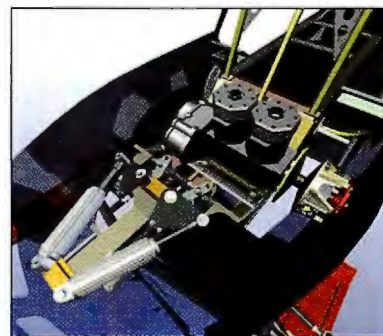
DIRECTOR UPDATE

Macromedia has updated *Director* to 8.5.1 and introduced an OS X version of its Shockwave player. The main enhancement is the introduction of full-scene anti-aliasing for 3D objects at rest, a feature introduced mainly for use in merchandise demos and other e-commerce applications, because it slows down frame-rates too much for use with animation. Macromedia has also added Windows XP support, 3D performance enhancements and fixed a number of bugs. CONTACT: www.macromedia.com

LIGHTWORKS IN REAL-TIME

LightWork Design, the makers of *LightWorks* rendering software, has announced a new package which enables users to interactively render and navigate through complex CAD models in real-time. Based on the *LightWorks* render engine which features in 3D software packages such as *trueSpace* and *form+Z*, *LightWorks Real-time Plus* offers, according to its developers, smooth navigation at a consistent speed, even on entry-level systems. Price has yet to be confirmed, but for more information and examples, visit the site below.

CONTACT: www.lightworkdesign.com



"HAVING ACCESS TO A TOP-END TOOL LIKE MAYA WILL HELP LEVEL THE PLAYING FIELD"

says. "This will enable them to hone their skills over time, which we see as a very exciting opportunity for the 3D world."

There are also implications for the thousands of training providers worldwide offering short- and long-term courses in the software. How will the release affect them? "*Maya Personal Learning Edition* is designed to give users

Swede animates Norwegian pirate

Filmtecknarna director Stig Bergqvist creates an animated version of Captain Sabretooth

It's cold and dark and lonely in some parts of Scandinavia, so there must be plenty of time for spine-chilling tales of swashbuckling skulduggery on the high seas. One such tale belongs to Captain Sabretooth, the world's cruellest pirate, who is very popular in Norway and has just become the subject of an animated feature. Directed by Stig Bergqvist of Filmtecknarna (see *3D World* issue 18) and *Rugrats in Paris* fame, the movie has a budget of \$5.2 million and will debut

in Norway at Christmas 2003. The movie will be created with Swedish companies High Life and ColorPop, who will be responsible for turning the pirates into animated characters. "It's incredibly exciting to have been trusted with the adaptation of such a Norwegian national treasure," says Ulf Synnerholm, MD of ColorPop. "Therefore, we proceed with the work we've already started, strengthening Scandinavian animation by targeting an international market." **CONTACT:** www.happylife.se



The stuff Nordic nightmares are made of, Captain Sabretooth, is now set to get his own movie...



Elegant and compact – looks like Apple has created another design-friendly workstation for the aspiring Llewellyn-Bowenses among us.

New iMac design

Apple reveals innovative iMac at the MacWorld Expo

Speaking a day before San Francisco's January MacWorld Expo floor actually opened, Apple CEO Steve Jobs announced a totally redesigned iMac to an excited pre-show crowd. Consisting of a 15-inch LCD monitor on top of a hemispherical 10.6-inch base, the new G4-powered iMacs come in three incarnations – 800MHz, with disc-burning SuperDrive (DVD-R/CD-RW); and two 700MHz iterations, one with Combo drive (DVD-ROM, CD-RW), the other with CD-RW drive. A GeForce MX graphics card, twin FireWire ports, dual-channel USB and OS X come as standard. Prices start at \$1,299. Visit the site below for coverage of the events at the MacWorld Expo, or visit www.apple.com for more information on the new machines.

CONTACT: www.macworldexpo.com
www.apple.com



MATCHMOVER 2 PROFESSIONAL

Realviz has released a new version of the 3D camera-tracking software solution, *MatchMover 2 Professional*. *MatchMover 2 Professional* incorporates all the elements of version 2.0, but adds a host of new features, such as efficient 2D tracking and helper frames for low parallax shots. The software also exports to industry apps such as *3ds max*, *LightWave*, *Maya*, *Softimage*, *Cinema 4D* and *Combustion*. *MatchMover 2 Professional* for Windows 2000/NT costs \$4,999.

CONTACT: www.realviz.com



3D courses

California, USA
Certificate Program in Animation,
3D Exchange

This course uses *LightWave* to prepare students for a career as an animator. There are five core classes, beginning with the

basics and followed by four levels, a studio tour and a final evaluation, with class sizes limited to ten or fewer and new courses starting every two to three weeks. Level one introduces modelling and texturing over eight weeks, level two moves on to more

advanced modelling/surfacing techniques, again over eight weeks, while level three focuses on the principles of animation and *LightWave*'s Inverse and forward kinematics, bones, morphing and subdivision surfaces tools for ten weeks. Finally, the 12-week level four

course teaches colour theory, colour temperature, additive colour space, lighting and compositing techniques.

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Flagship animation

Respected animation house HR3d assembles a CG ferry bit by bit for SeaFrance

LK animation production company HR3d has recently completed a 30-second commercial for SeaFrance, featuring a CG construction of Rodin, the ferry company's new flagship. The ad shows the ship forming from within a chasm in the CG sea, which was created using Areté software. The skeleton of the vessel forms section by section, from floor to ceiling, and as the camera glides through the liner's interior, 400 individually animated chairs, partitions complete with pieces of art, overhead spotlights and table lamps and other furniture appears. The ad ends with – you've guessed it – an exterior shot of the liner sailing off into the sunset. To ensure the CG version, created in *Maya*, would be as accurate as possible, HR3d thoroughly researched the real Rodin ferry when it was docked in Finland prior to its maiden voyage. 2D CAD and



photographic data was used to construct a scale model and live-action cameras and lighting were employed to demonstrate the depth of the ship's textures, which were created using detailed mapping and visual stills.

The Ronin ad for SeaFrance aired in the UK on 28 December 2001.

CONTACT: www.hr3d-online.com

EVENTS

6-11 APRIL NAB 2002

Not strictly anything to do with 3D per se, but the world's largest electronic media show is still a must for professionals in TV or film. Related topics, such as broadband and digital video, are among the many technologies covered, along with over 900,000 square feet of exhibits from, well, absolutely everyone in the media world. www.nab.org/conventions/nab2002/

3-8 JUNE Annecy 2002

Le festival international du film d'animation, and a jolly good excuse for a jaunt to France. Annecy claims to be the biggest international animation market, offering an exhibition and festival together with the annual awards and a job fair for aspiring professionals. www.annecy.org

21-26 JULY Siggraph 2002

Need we say more? If you're in the 3D 'biz' and you haven't heard of Siggraph, the world's largest and possibly loudest graphics show, there's no hope for you. Although covering all areas of graphics, it's predominantly 3D-led and features top speakers, a massive exhibition, where all the majors launch their new projects, plus the chance to network like hell. www.siggraph.org

MIX AND MATCH BATCH

The pick 'n' mix of the 3D render world is upon us

Softimage has released a new set of rendering tools which will enable users to virtually create their own mix-and-match rendering environments.

Top of the list is *BatchUniversal 2.0*, which enables scenes created within *Softimage XSI 2.0* to be rendered along with files generated by the likes of *Maya*, *3ds max* and *Houdini*.

BatchUniversal incorporates the full version of *mental ray 3.0* and is fully scriptable, so scenes from various sources can be rendered out independently while the designers get on with something else. *Batch 2.0* is a similar proposition, except it works only with scenes created in *XSI 2.0*.

BatchUniversal is available from \$2,750 for dual-processor systems, while *mental ray 3.0* is being made available as a stand-alone from as little as \$950 per processor. *Batch 2.0* will set you back \$1,495, again for dual-processor systems.

CONTACT: www.softimage.com

LOST BOYS' DOPE VIDEO

Lost Boys Studio completes effects for REM and DOPE

You'd expect the move into a new market for an effects company to be a gradual process, but Vancouver's Lost Boys Studios seem to have effortlessly bypassed the daily grind by landing work on REM's "I'll Take the Rain" promo and DOPE's "Now or Never".

Compositing Flash animation and live action for the REM single was followed by work on DOPE's video, creating animated 3D glass and providing compositing for a sequence in which two teenagers jump through a glass barrier to be closer to their angst-ridden metal heroes. Lost Boys also composited 17 split-screen time-warp shots to create the effect of one band member leaping into the air while the others carry on playing. Lost Boys aims to continue creating effects for music projects this year, and has also recently completed a series of three 15-second Toyota Celica spots, featuring time-warping and particle effects shots.

CONTACT: www.lostboys-studios.com

Go Academy, Malaysia Diploma in Computing

This two-and-a-half-year modular Diploma course specialises in animation and visual effects. Modules on offer range from modelling, surfacing and animation through to lighting, cameras, rendering and compositing, plus life drawing, film

studies and the business of visual effects. The Academy is a Softimage-approved academic partner, and the course's tutors are qualified XSI experts.

CONTACT: Albert Chew
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E: albert@go-academy.com
W: www.go-academy.com

BBC recreates C4 sea battle

The Hood and Bismarck showdown is visualised by BBC Resources for C4

A Channel 4 documentary recreating the legendary battle between the giant warships HMS Hood and the Bismarck in 1941 features 3D effects work from BBC Resources, London. The two 90-minute documentaries showcase almost 50 effects shots depicting the attacks on the two ships, as well as 12 animated maps tracking the progress of the British Navy as it hunted down, crippled and eventually sank the German flagship. The main effects dealt with the explosion in the Hood's aft

SHEETS OF FLAME WERE CREATED USING FLAME PROJECTORS SHOT AT 250fps

magazine, which obliterated the ship and was accompanied by what eyewitnesses describe as a 'column of fire', and other pyrotechnic effects.

A variety of different flame, smoke, pyrotechnic and cloud tank elements were shot and assembled into a library of high-speed 16mm film elements by the BBC Visual Effects team, headed by Mike Tucker, and then used by senior animators Andy McNamara and Mike Gilbert to create realistic explosions, smoke and fire for the vivid reconstructions. Following the eye-witness accounts of the destruction of the Hood, sheets of flame were created using Flame Projectors shot at 250fps, while water plumes were simulated by using salt in high-pressure air mortars.

On the 3D side, *Maya Unlimited* was used to animate a sequence showing in detail the path of the 15-inch shell fired from the Bismarck. It was this projectile that sliced through the Hood's armour belt and all the upper decks to cause the fatal explosion. It was decided that an x-ray type treatment, heavily stylised with a slowed speed ramp, combined with overviews of the battle showing shell trajectories and the positions of all the ships involved was the best way to convey the impact.

Compositing was achieved using *Illusion*, *Shake* and *Blender* to provide all the tracer fire necessary, and *Inferno's* 3D camera helped to add the necessary depth to particle shots, such as water spouts from the impacting shells as they hit the surface of the sea. The work took a total of five months to complete, and was first transmitted over Christmas.

CONTACT: www.bbcresources.com

Smell the glove

Essential Reality reveals its unorthodox P5 glove peripheral

New York company Essential Reality is set to offer a helping hand to the 3D artist with the P5, its futuristic new glove peripheral. Offering a stern challenge to the dominion of the mouse and to contenders like IBM's SpaceBall, the P5's six degrees of freedom enables users to control in-game characters, execute commands and manipulate images through mere movements of the hand.

Though only just revealed at January's CES trade show in Las Vegas, the device's obvious potential for working within 3D software interfaces won't go unnoticed by the major software providers, according to Essential Reality's VP of marketing, David Devor. "The P5 serves as a motion capture unit as it currently stands, but it will be in the software for many different 3D applications to take full advantage," he says. "Out of the box, it's recognised as a mouse and joystick, but with our code

integration into various applications, users can take full advantage of the six degrees of freedom and gesture-recognition capabilities."

Using a combination of Essential Reality's own sensor and tracking technologies, the P5 promises to be extremely intuitive as it mimics users' hand motions in space, and will become available for a range of operating systems, including games consoles, as the product develops.

For more details, visit the site below.

CONTACT: www.essentialreality.com/products.html



The P5 from Essential Reality – The future of interaction or evil Cylon love weapon?

Materials for Hash

Darkling Simulations has just released *Simbiont AM 2.0*, an update of its Windows-only materials plug-in for Hash's *Animation:Master 8.5*. The new version features custom controls for 120 procedural materials, which can be used to create a broad range of permutations and tweaked to fit your scene. *Simbiont AM 2.0* also includes 23 new 'primitive' materials which can be layered with other *Hash:AM* materials or applied to any surface attribute channel, such as colour, specularly, and so forth. *Simbiont A:M 2.0* costs \$75 with an upgrade price of \$25. A demo of the max version, *SimbiontMAX 2.0*, is also available from the site below.

CONTACT: www.darksim.com

Live 3D for DJs

Author real-time interactive visuals to spice up your set, courtesy of Canadian outfit Derivative Inc.

According to Derivative Inc, its creators, *Touch 007* is a 3D product family for DJs wishing to spruce up their act with interactive 3D visuals. Real-time MIDI-controlled 3D graphics are created using the same principles that govern music sequencing software, and *Touch 007* comes in three

separate modules. *Touch Designer* is a content-editing tool derived from Side Effects' *Houdini* and uses a procedural node-based architecture to enable the modelling, texturing and lighting of 3D objects, characters and the creation of motions and beat-matched behaviours. You then build control panels, wire them

Wildcat III released

3Dlabs' famous graphics card goes version three

The latest graphics card from 3Dlabs, the Wildcat III, offers several enhancements over its successful predecessor. A new integrated graphics processor ASIC that combines T&L geometry and rendering functions is joined by twice the on-board memory bandwidth, improved line antialiasing performance (which supports 32 light sources) and improved gradient fill performance. 3Dlabs has even thrown in enhanced texture support. Price to be confirmed.

CONTACT: www.3dlabs.com



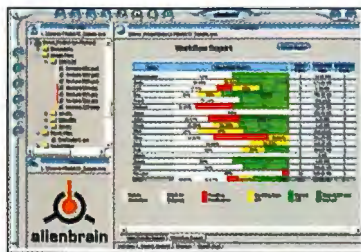
Alien brains OK

EA gives the thumbs-up to asset management

Digital production management specialists NXN Software has struck a deal with Electronic Arts software where EA will use the *alienbrain 5.0* DPM management system in its games studio worldwide.

EA tested *alienbrain* during development of *NHL 2002* and liked it so much, it bought the company – sort of. EA owns Maxis and Westwood Studios among other subsidiaries, and develops titles for both consoles and the PC.

CONTACT: www.nxn-software.com



up to any part of a 3D scene and display your work using the 3D viewer *Touch Player*. Finally, there's *TouchMixer*, which enables you to record MIDI and mouse gestures into sequences that can then be edited into QuickTime movies. It also enables the customising of downloaded artwork with new textures and movies. The product has been extensively beta-tested at various club nights in the US.

TouchDesigner runs on Windows 2000, NT or XP and costs \$1,999; *TouchMixer* is priced at \$199. *Touch Player* is free.

CONTACT: www.derivativeinc.com

ShapeCam

Portable 3D scanner solution unveiled for *ShapeSnatcher Suite*

ShapeCam is an ingenious new hardware solution from Eyetronics which captures 3D geometry and textures using a digital camera with a laser-measuring device. You can then assemble the images in Eyetronics' *ShapeSnatcher Suite* software. The device is operated by setting the distance between the camera and the target object by converging two laser markers. When the picture is taken, a flash unit projects a grid onto the object, which provides a reference coordinates from which *ShapeSnatcher Suite* creates a textured and lit 3D model. You can take as many captures as you like to recreate any object, from a coin to a human body.

A bundle consisting of *ShapeSnatcher SuiteXT* or *ShapeSnatcher SuiteCAD* for Windows, Linux or IRIX and *ShapeCam* retails for \$18,250.

CONTACT: www.eyetronics.com



web 3D

CLEANER 5.1 FOR OS X

Discreet has announced version 5.1 of *Cleaner* at the Macworld Expo in San Francisco. The streaming media transcoder now supports *Sorenson Video 3 Professional* and is available on the Mac OS X. Download it from the site below for \$599. www.discreet.com/products/cleaner

LIGHTWAVE 3D IMPORT FOR AXEL

MindAvenue has announced the new *AXELedge 1.5* importer for Mac users of *LightWave 3D*. This enables users to add interactive elements to their scenes and publish them on the Web without resorting to any tricky programming. *AXELedge 1.5* uses a drag-and-drop method to offer features such as animation, modelling and constraints. Among the new items on offer are the ability to import movie clips and use them as textures, a number of rendering modes, including cartoon and custom wireframes, and EPS import. *AXELedge 1.5* for the Mac costs \$950, with an educational price of \$245. www.mindavenue.com

VERSION 8 OF MEDIA 100 FOR OS X

Media 100's streaming media production hub for Mac OS X has reached its eighth iteration. New features include optimisations for OS X and improved layer capabilities. The new version is expected to be available from the middle of 2002, with prices starting from £2,295. www.media100.com

SITE OF THE MONTH

Head over to the site below for a wealth of useful anatomical reference material for 3D artists, thanks to Peter Levis. www.fineart.sk

SIMBIONTS 2.0 IS RELEASED

Darkling Simulations has released version 2.0 of *SimblontTS*, the material plug-in for Calligari's *trueSpace5*. The plug-in works across all four shader channels – colour, transparency, displacement, and reflectance – loading procedural texture files and dynamically building the surfaces in *trueSpace5*. Version 2.0 has been completely re-written and features an improved interface and new custom controls for each procedural texture included in the package (more than 100 of them). The new controls – including, for example, crust level, rustiness, and pit-size – offer a huge amount of flexibility in creating a wide range of textures.

SimblontTS 2.0 costs \$79 from new or you can upgrade from version 1.10 for \$29 collection.

CONTACT: www.darksim.com



LUME TOOLS FOR MAX 4

Originally written for SoftImage in conjunction with Cyan, Inc for use in *Riven*, *The Lume Tools Collection 1* plug-in is a collection of shaders for 3ds max 4 which helps create realistic natural effects. Ocean, water, wet and submerge shaders create animated bodies of water with accurate reflective and refractive properties above and below the surface, while landscape offers control over landscape rendering, and a stain shader for the creation of a mixture of wet and dry on a single object. *The Lume Tools Collection 1* costs \$295.

CONTACT: www.digimation.com





Effects oscar nominees

The Academy nominates eight hopefuls for this year's Oscars – and the contenders are all strong ones

The 74th Academy Awards will see the following eight nominees vying to nab the coveted statuette for Achievement in Visual Effects: *A.I. Artificial Intelligence*, *Black Hawk Down* (above), *Cats and Dogs*, *The Fast and the Furious*, *Harry Potter and the Sorcerer's Stone*, *Jurassic Park III*, *The Lord of the Rings: The Fellowship of the Ring* (above) and *Pearl Harbour*. The Academy Awards will be presented on 24 March 2002 at the Kodak Theatre in Hollywood, with a shortlist announced on 12 February.

Other 3D-related Academy Awards have been decided upon already. 21 winners will receive awards for Scientific and Technical Achievement in the film industry, and these winners will be presented on 2 March. Technical

Achievement winners include: John Anderson, Jim Hourihan, Cary Phillips and Sebastian Marino for the development of the ILM Creature Dynamics System for hair, clothing, skin, flesh and muscle simulation; and Dr Steve Sullivan and Eric Schafer for the development of the ILM Motion and Structure Recovery System (MARS), which analyses camera motion and object motion with a rich set of user-interface tools and sophisticated algorithms. Finally, Dr. Uwe Sassenberg and Rolf Schneider receive an award for the development of 3D Equalizer, the renowned camera and object match-moving system. For more details, visit the official site below.

CONTACT: www.oscars.org

Dressing to kill

UK-based Kelseus has just released **CLOTH Engine** to help 3D animators create production quality, realistic fabric and clothing. The technology was introduced last year as a plug-in for *3ds max*. However, the **CLOTH Engine** offers cross-platform support and is aimed primarily, although not necessarily exclusively, at developers.

"The incredible realism of the clothing simulation in box-office movies such as *Final Fantasy* and *Shrek* has excited all 3D animators. They are now demanding this functionality and high quality in an off-the-shelf package at a price they can afford," says Rob Freeman at Kelseus.

The **CLOTH Engine** can be integrated into any animation package, with the appropriate authoring, and Kelseus is committed to further research and development to take cloth simulation to greater, more sophisticated levels. It also sees possible interest coming from developers of CAD and architectural applications that feature cloth-based components. The *3ds max* plug-in isn't being forgotten and version 2 is due for release in February.

Licensing fees for **CLOTH Engine** should start at around £50,000.
CONTACT: www.e-onsoftware.com

games

CUBE HITS EUROPE

Following a sneak preview at Milla in Cannes, Nintendo's eagerly anticipated GameCube is rumoured to be set for a European release in March 2002. The console has already sold well in the US and Japan, and its European unveiling will coincide with the release of 20 new games, including *Star Wars Rogue Squadron 2: Rogue Leader* and *Sonic Adventure 2*.

CONTACT:
www.nintendo.com

XBOX RELEASED

Not to be outdone by its cuboid rival, Microsoft's Xbox is due to hit the shops on 14 March. A wide range of day one software releases are expected, with the ultimate master of time-suckage *Champion Manager Season 01/02* ready to make its console debut along with *Buffy the Vampire Slayer*, *Munch's Oddysee* and *Tony Hawk's Pro Skater 3*, among others.

CONTACT: www.xbox.com

KARMA FOR BLACK AND WHITE

Black And White developer Lionhead Studios is using MathEngine's *Karma* for PS2 and Xbox versions of its outstanding PC title. The decision to use the middleware was made because of the tight development schedule. *Karma* has previously been used for Epic's *Unreal Engine* and in NASA research projects. Visit the site below to find out more about its capabilities.

CONTACT:
www.mathengine.com

STUDIO ARTIST 2.0

The latest version of Synthetik's special effects, paint and rotoscoping software, *Studio Artist 2.0* for Mac OS 9 and OS X, features an improved paint synthesiser, better time-based effects and image-processing tools and effects, including real-time warping and highly editable 3D paint effects. The software also includes eight hours of QuickTime video-training. *Studio Artist 2.0* costs \$379, with an upgrade price of \$179.

CONTACT: www.synthetik.com

GET THOSE RHYTHM AND HUES

Rhythm and Hues, the award-winning film production studio responsible for the polar bears quaffing Coke in recent commercials and talking pig Babe, has made some of its modelling libraries available through the digital marketplace, Turbo Squid.

The collections include *Office Volume 1*, *Military Volume 1* and *Marine Animals Volume 1*, so if you want a top-quality 3D tape dispenser, machine gun or Great White, a *Rhythm and Hues* model might just fit the bill. All models are in the .obj file format, priced individually, and can be downloaded from Turbo Squid. You can even bag a pile of poo for \$20 – an offshoot of the *Animals* collection, we hope.

CONTACT: www.rhythm.com, www.turbosquid.com



MOVERS

CALIFORNIA'S AREA 51 FILMS has launched a new feature film division, overseen by head of production Rachel Griffin. The company has previously created a variety of TV and broadcast output.

VANCOUVER'S CREDO INTERACTIVE has announced a new motion-capture conversion service for *Maya* users, with other formats said to be on their way in the near future. Visit them at www.charactermotion.com

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Artwork by esaim, background created with Vue d'Esprit 4

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Confused? Angry? Delighted? To have your say on anything at all simply send an e-mail to 3dw.views@futurenet.co.uk or visit the forums at www.3dworldmag.com/forum

SUBJECT: ANAMORPHISM

I hope you can recommend what would be the best software

program for my needs. This is the situation: I'm looking at paintings of the 17th Century where they used anamorphic images – you know, where you have a distorted image in a picture, but it looks right when you see it from a certain viewpoint, or in the reflection on a properly positioned mirrored cylinder or cone. So what would help me is:

1. If I could import a bitmap image of a painting into a 3D program and place a reflective 3D object (cone or cylinder) somewhere on its surface, then move round the two of them in 3D space to see the image in the reflective surface and decide the best viewpoint, as well as rearrange the position of the cylinder to find if there were other distorted images in the picture. I'm obviously looking for something that will give a good rendering of the image and not something that will take me two years to master.

2. Failing that, if there is a program which could help me remap these bitmap images – say, a circle gridded by concentric circles and verticals coming from the centre, where I could take part of the grid and remap it into a grid of equal squares.

Obviously money is an object in all this and a cheap solution would be the best option. I realise these programs are kind of expensive, though.

I've already found free and simple anamorphic programs on the web which change the ordinary image into a distorted one, but really I'm looking for something to do the opposite – remap the distorted image into a real one. Any ideas on this? You seem to mention *Maya* a lot in your mag but it is a bit pricey. Is this one of the better programs for this sort of thing?

Malcolm Aslett, via e-mail

Good question, and an unusual one too. The problem here is that you need to see reflections in real time, so you can judge the right position to put the object in. It's a problem because

while any decent 3D package with raytracing will be able to render you an image, none of them can actually show reflections in real time (to my knowledge). LightWave and others can do real-time reflection mapping, in that it will show a background image (or similar) reflected on a flat surface – but it can't do objects in real time, as that would require real-time raytracing.

So while you could guess the right position of the cylinder by hand, it would require a lot of tedious rendering and re-rendering to check this in reality. Unless someone else out there has an alternate solution – or even a program that can do what you ask.

SUBJECT: ARTIST SKILLS? HELL, NO!

Referring to a reply of yours to a letter by Marc Urlus (issue 21) about traditional skills being a requirement. I think you're well off the mark. I'm a lead animator in a UK-based company with no previous art-based education and I can't draw to save my life.

Yes, I agree storyboards are necessary for animations... but they don't have to be that good, as long as you get the basic message across.

Artistic talent does not just mean you can use a pencil without snapping the lead; it applies to all sorts of skills. As for your amazing insight into walk cycles... well, excuse me, but people walk past me every day; I don't need a drawing. Use your eyes!

Obviously, you have to have talent to produce good work but comments like yours only serve to put people off.

Oh and three things...

1. You are being old-fashioned and protectionist.
2. What's with the price increase?
3. Do I get a free subscription despite slagging you off?

Ad, via e-mail

To answer Number 3 first: no, mysterious 'Ad,' you do not, you cheeky blighter. (We'll come back to 1 and 2 in a minute.)

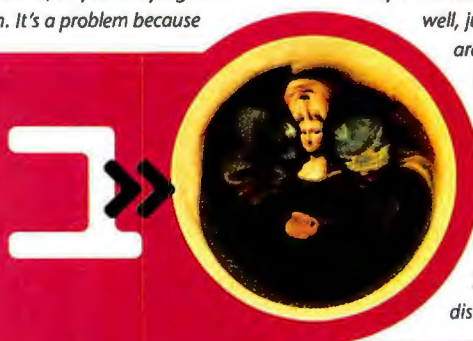
As for the rest: you are of course entitled to your opinions (wrong though they are), but I reckon the majority of artists in 'the biz' would agree with me (cue a flood of artists vigorously rising to Ad's defence). As for YOUR amazing insight into walk cycles: if you truly believe that creating a realistic walk cycle is as simple as,

*well, just looking at people and then dashing it off, you *are* one of the geniuses I mentioned in my reply or b) have clearly never tried doing it before. That's like saying, 'Painting like da Vinci is easy – you just need to use your eyes.' Incidentally, were your unnamed employers aware of your lack of skills when they hired you?*

So, back to 1 and 2.

1. Protectionist of what? I edit a magazine about 3D on computers. Why on earth would I want to discourage anyone from joining the industry?

An anamorphic image of the Mona Lisa on a conical mirror, as viewed from above – the complete central image is what the cone is reflecting. Image courtesy of www.anamorphosis.com, which also offers freeware called *Anamorph Me!* www.anamorphosis.com



CONTACT 3D WORLD

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**TECHNICAL AND
CREATIVE QUERIES**
3dw.qanda@futurenet.co.uk

**CONTRIBUTIONS
TO OUR COVERDISC**
matt.gallimore@futurenet.co.uk

2. Paper costs, printing costs, distribution costs – you name it. It's not something we enjoy doing, obviously, but it doesn't happen often – we've been £5 since we launched back in July 2000.

Seems like a perfect point to segue into this letter...

SUBJECT: ARTIST SKILLS? HELL, YES!

I'm writing in response to Marc Urlus' letter on the argument of whether or not you need to know the traditional skills of animation to be a digital animator. I myself would agree with Marc. However, if he wishes to develop his skills to a higher level, I would strongly suggest he listens to the advice of the professionals.

I'm studying at the Arts Institute in Bournemouth. Although this course is a traditional animation course, my graduation film is being digitally animated. A year before I began, I started learning the digital tools... my animations were okay, but never really as good as they could be. Once I began learning the way of traditional animation, however, my skills greatly improved and now I apply everything I learn from traditional animation into my digital animations.

I'm hardly the best artist on my course, but I find drawing can speed up the concept design of my ideas. On paper you can

simply scribble away, whereas on a computer this isn't so, because everything is much more technical and almost perfect.

I work alongside other traditional animators on my course and we are all constantly sharing ideas on how to improve our own work; there is no wall between us 'digital guys' and the 'traditional guys'.

No matter what medium you may be animating in, the fundamentals of animation still apply to all and the best way to learn your craft is through traditional animation. You can teach anyone to use a computer, but you cannot teach somebody how to be creative. I suggest that Marc begins to listen to what other animators have to say, for their advice is worth listening to. (Many thanks to 3D World for allowing animators to share their views and opinions in this way.)

Daniel Carey, via e-mail

Masters such as Richard Williams (in his book *The Animator's Survival Kit*) certainly encourage budding artists to master traditional media before delving into software. No-one's saying you have to be Tex Avery, but a good grounding in basic artistic techniques will always be a boon.



FROM THE FORUMS Have your say or get advice in our forums at www.3dworldmag.com

SUBJECT: How do I make moving ropes?

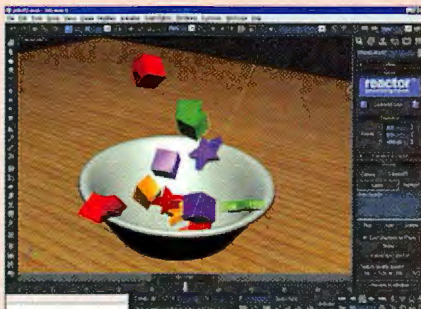
Riptyde:

I'm building a sailboat for a Web page in 3ds max and need to animate a rope moving through pulleys and coiling on the floor of the boat. Does anyone know a good way to show this? Preferably without plug-ins. Thanks.

AJ_23:

For a proper treatment of ropes, you'll be hard pushed to get promising results without a plug-in (sadly). You COULD manually keyframe the verts of a renderable spline for the motion/coiling... or if you can sacrifice the coiling part of the animation, you could animate the texture map to move instead of the actual rope (would be only really useful on a close-up of, say, the rope moving through a pulley). If you don't mind plug-ins there are two that instantly spring to mind, one being Chaos Group's SimCloth www.chaosgroup.com/SimCloth.html Its main use is cloth dynamics, but you could easily adapt it to solve your current problem (download the tutorials and look at the scene files and you'll see how versatile its dynamics solution is). Oh, and it's FREE! No, I don't work for them – just a big fan of SimCloth.

The other choice is Reactor... It actually has rope dynamics as a feature and although you'll have to go through the rigmarole of learning



Discreet's Reactor is a thoroughly wonderful dynamics plug-in for 3ds max, but it's not exactly cheap.

Reactor's interface/processes – it's very good and extremely fast at what it does. For more information, visit www.discreet.com

SUBJECT: 3ds max and facial measurements

Biggerveggies:

Hello, everyone. I'm very new to 3ds max and I'm planning to use a Cyberware scanner to study soft-tissue structure in humans. I was wondering if max can easily measure the distance between two facial landmarks? For example, the distance (including curvature) between the ear and tip of a subject's chin. Sorry if my question is unclear. In the most simple sense, if I scan in a sphere, could max tell

me the circumference? (However, I will be needing max to give me these measurements from a complex facial scan.) Any help would be deeply appreciated. Thanks.

Neil@Art19:

If you scan in the model at full scale and set the units of measurement to, for example, millimetres, then max should have accurate measurements of your model. max's Ruler helper can easily measure the exact distance between two given points. Measuring the distance over a contoured surface may prove more problematic.

If there are any good mathematicians out there, I'm sure they could help you work out the measurements you need with a formulae using reference points, but I don't recall max having the ability to measure contours.

Riptyde:

You may want to try software that is more geared for engineering. What you're trying to do is not uncommon for something like Rhino 3D, Alias, ProE, and other applications. I use Rhino every day and take just the kind of measurements you're trying to make.

If you try Rhino and can get the model into the program, let me know and I might be able to help you obtain the measurements you want.

20 years OF CGI

TOP The marvellous *Fiat Lux* animation, created by Paul Debevec, presented at Siggraph '99. It was created using image-based modelling and high dynamic range image-based lighting.

FAR RIGHT The availability of powerful, affordable modelling and animation software, such as *Softimage*, has transformed the working practices of the industry since the days of *Tron*, when each studio used radically different technology.

After *Tron*, everything changed. The computer graphics industry had evolved at an astonishing rate since DEC launched its PDP-1 computer in 1960 and Ivan Sutherland had created the landmark *Sketchpad* software. But with the arrival of Disney's idiosyncratic science-fiction adventure in 1982, the curtains were finally drawn back – and the spotlight shone on a hitherto unimagined world of digital artistry.

At least, that's the shorthand explanation. The reality is inevitably rather less clear-cut. *Tron*'s famous 15 minutes-worth of computer-generated visuals still remain a landmark, and provide an ideal starting point. But even that esteemed movie was beaten to the punch. *Star Trek II: The Wrath Of Khan* premiered a good month earlier, and it boasted the first example of raster-based digital movie effects, used to create the still-impressive 'genesis' terraforming sequence.

Furthermore, cinema audiences were given a taste of primitive computer graphics in *Futureworld* (1976), *Star Wars* (1977), and *Alien* (1979). Even *Westworld* (1973) contained some 2D effects. MAGI, one of the studios that worked on *Tron*, also created a CG-based TV ad for IBM in 1969. And those looking to

trace a line back to the very first meeting between the graphics and entertainment industries must delve as far back as 1958, to the use of analogue computer visuals in the opening credits of Hitchcock's *Vertigo*.

There were also a number of other events and factors influencing the graphics industry's move from academia to the world of entertainment. Clearly, there are many innovators whose contributions are integral to today's 3D computer graphics industry, but who have chosen not to align themselves with the entertainment industry. Jim Blinn, the father of environment and bump-mapping, is one such pioneer. Despite creating the legendary Voyager fly-by animations at JPL and contributing CG work to Carl Sagan's *Cosmos* series, the artist has remained interested more in the academic than the commercial aspects of the computer graphics field.

But there are also a great many people and places that have played a direct role in the industry's migration from lab to Tinseltown spotlight. Two distinct strands can be traced, the first of which involves the CG studios founded in the '60s and '70s; specifically, Triple I, MAGI, Robert Abel & Associates, and Digital Effects Incorporated. These four attracted several



20 years after computer graphics broke through into the mainstream with the release of *Tron*, *3D World* celebrates with a look at the story so far and fresh insights from two leading lights of the CG industry.

BY MARK RAMSHAW

DISNEY'S *TRON* ALTERED THE FACE OF COMPUTER ANIMATION FOREVER...



PICTURE COURTESY OF: © Twentieth Century Fox

ABOVE Since a buyout by 20th Century Fox in 1999, Blue Sky Studios has made the transition from an ad and movie effects outfit to a fully-fledged CG animation studio. Its highly impressive-looking debut effort, *Ice Age*, premieres in March.



notable 3D gurus, and quickly tapped into the commercial potential of the technology. Early forays into advertising and film effects would culminate with the quartet all contributing to *Tron*.

Former NASA engineer Carl Ludwig was working on film recorder design for Celco in 1977 (for which he's to receive an Academy Award this year) when he met the chairman of MAGI, the late Phil Mittelman, at Siggraph. MAGI had, in fact, started out as an independent nuclear research company, coming up with a raytracing system while attempting to devise

a system for visualising shielding. "I came in at the tail-end of *Tron*," he remembers. "The technology was amazingly crude by today's standards. Towards the end of the production, we were using a Gould machine, the size of a lorry, yet with just 2MB of memory. It's amazing that we were able to create the footage."

The second strand can be traced back to Ivan Sutherland's move to the University Of Utah in 1969. He quickly built up a talent pool, including the likes of Jim Clark (who would go on to found Silicon Graphics), Dr Ed Catmull, and Phong Bui-Tong

TIMELINE

- 1951 Vector display created using Whirlwind computer
TV programme *See It Now* features CG demonstration
- 1958 Analogue computer images created for the movie *Vertigo* by John Whitney Sr
- 1960 The term 'computer graphics' is coined at Boeing
DEC introduces the PDP-1 computer
- 1961 Steve Russell at MIT creates *Space Wars*, the first ever computer game
Ivan Sutherland develops *Sketchpad*
- 1962 Triple I founded
- 1963 Coons patches introduced
Bell Labs makes first computer-generated short
IBM creates first CAD system
Hidden line algorithm created at MIT
Boeing creates first digital human
- 1964 RAND input tablet created.
- 1965 University of Utah creates computer science department
- 1966 MAGI founded
Odyssey, the world's first home video game, created by Ralph Baer
- 1967 General Electrics creates the first ever flight simulator, for NASA
- 1968 Intel is founded
University of Utah creates a computer graphics department
John Warnock introduces hidden surface removal algorithm
Evans & Sutherland is founded
- 1969 Bell Labs creates the first ever frame buffer
Xerox PARC is founded
 Nolan Bushnell creates *Computer Space* arcade game
 Alan Kay at Xerox creates the first

"WHEN WE STARTED IN THE '70s, COMPUTERS WERE A MILLION TIMES SLOWER THAN THEY ARE TODAY"

ALVY RAY SMITH



switch to digital effects production, and for the birth of relatively modern outfits, such as Pixar.

"We knew all along that it was just a matter of time before CG took over the movie world," says Alvy Ray Smith. "When I say, 'we,' I'm referring to the group of people who were first known as NYIT, then Lucasfilm Computer Graphics, then Pixar – same group, different rich guy at the financial controls. For example, the original four musketeers were Ed Catmull, David DiFrancesco, Malcolm Blanchard, and myself; we were at the beginnings of all three places mentioned, and there were others along for most of the ride, including Bill Reeves, Tom Duff, Tom Porter and John Lasseter for the latter half."

Alvy echoes Carl's comments about the limited technology of the day. "The only thing that hampered us was the lack of affordable computing power at any given time. When we started in the '70s, computers were one million times slower than they are today. Or cost one million times as much depending on what you keep constant. In other words, CG in the movies was possible, but too expensive. But we knew all along that we wanted to be the guys who did the first completely computer-generated movie, and that it would be possible some day when the price dropped."

Nevertheless, Alvy dismisses the notion that the research focus shifted away from engineering and science and towards the entertainment industry during this era.

"You just did what you could at the time. Early work was line-based CAD engineering stuff, but that was a result of the technology. We all thought Hollywood was set to become the

(creator of the Phong directing lighting algorithm). With Catmull and several others departing the University of Utah for the New York Institute Of Technology, the East Coast became a creative hotbed of CG development. It was at the New York Institute Of Technology, for instance, that Alvy Ray Smith created the first ever 24-bit paint program, and that Ed Catmull developed Z-buffering, tweening, curved surface algorithms and other key 3D concepts. And it was the subsequent exodus of key talent from the NYIT to Lucasfilm that paved the way for the effects seen in the aforementioned *Star Trek II*, for ILM's

TOP RIGHT An impressive excerpt from Paul Debevec's Siggraph '97 animation *The Campanile Movie*, which depicts a virtual Berkeley Campus using techniques outlined in Paul's Ph.D thesis.

graphical user interface
MAGI creates first CG ad (for IBM)
Siggraph is formed, providing a platform for information sharing within the industry

1970

Pierre Bézier at Renault introduces the Bézier curve

1971

Henri Gouraud develops his method for shading curved surfaces
Robert Abel & Associates is formed

1972

Ohio State opens its computer graphics group
Atari is formed and introduces the *Pong* video game
Graphics Symbolist System developed at Utah State

1973

Westworld premieres, featuring 2D computer graphics
Siggraph holds its first conference
Rich Riesenfeld develops b-splines
Richard Shoup creates the PARC raster display system
Donald Greenberg opens the Program of Computer Graphics department at Cornell

1974

John Whitney Jr and Gary Demos at Triple-I open up the Motion Pictures division
Alex Schure opens NYIT's graphics lab (Ed Catmull is made director)
Alvy Ray Smith and Dick Shoup create *Super Paint*
Ed Catmull devises the Z-buffer.
Peter Follies' *Hunger* CG animation wins award at Cannes

1975

Phong Bui-Tuong introduces Phong illumination
Benoit Mandelbrot at IBM introduces fractals to the world
Ed Catmull develops his curved surface rendering algorithm
Bill Gates founds Microsoft
The Utah Teapot model is created by Martin Newell
Bob Holzman opens the Jet Propulsion Laboratory

1976

Ed Catmull introduces Tweening software
Jim Blinn creates environment-mapping for reflective surfaces

PICTURE COURTESY OF: © Babylonian Productions



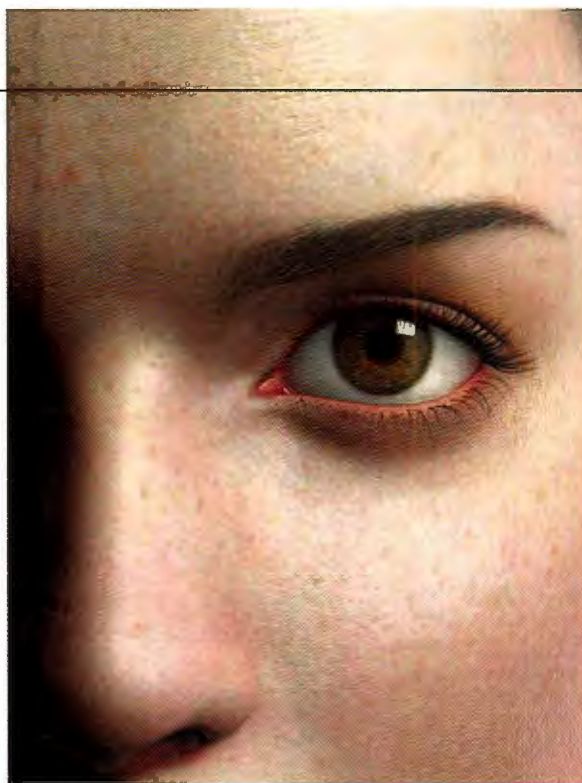
"WE USED A GOULD MACHINE,
THE SIZE OF A LORRY, YET
WITH JUST 2MB MEMORY"

CARL LUDWIG



TOP LEFT With the launch of *Babylon 5* in 1993, Foundation Imaging demonstrated that broadcast quality rendering was possible with the most modest hardware set-up.

RIGHT & TOP MIDDLE Although its box office performance has prompted Square to withdraw from the movie-making business, its *Final Fantasy* remains a visually impressive creation.



driving force, because it was the only industry that had a history of gambling the huge amounts of money CG would require for its early existence. I suppose the military could have been such a source, too, but hardly anybody in the field would have tolerated that. This was the time of Vietnam and there was a uniform dislike of that war and the distrust of anybody associated with it."

So *Tron* followed *Trek* – and then came *The Last Starfighter*. Technology had progressed enormously in just two years, with the fully rendered scenes supplied by Gary Demos and John Whitney Jr contrasting sharply with the stylised CG effects of *Tron*. Unfortunately, neither movie performed particularly well at the box office. Hollywood's love affair with computer graphics appeared to be over almost as soon as it had begun, and a number of companies, including MAGI, subsequently closed their doors.

"The thing about the technology in the MAGI days was that we could make light-cycles and tanks, but a fully animated character would have been out of the question," admits Carl Ludwig. "CG hadn't matured to the point where it could be used as a tool for a wide range of things. It still needed to mature and become cost-effective. But, crucially, from those now defunct companies the seeds were formed for the studios

Apple Computers is founded by Steve Jobs and Steve Wozniak
Triple I provides 3D CG for *Futureworld*

1977

Star Wars features a CG trench simulation sequence, utilising the Graphics Symbiosis System created by Tom Defanti at Ohio.

Jim Blinn creates first Voyager fly-by animation at JPL
Ed Catmull and Alvy Ray Smith at NYIT devise the concept of the alpha channel
Paint 3, the first RGB paint package, created by Alvy Ray Smith

1978

Jim Blinn creates *The Mechanical Universe* animations and also devises a system for bump-mapping
Digital Effects Incorporated is founded

1979

The Black Hole uses computer graphics for its opening sequence
TV series *Cosmos* features computer graphics, created with help of Jim Blinn and Alvy Ray Smith at Caltech

1980

Ed Catmull, Alvy Ray Smith and other key NYIT personnel join Lucasfilm
Carl Rosendahl founds Pacific Data Images

Hanna-Barbera begins using a computer animation system
Quantel launches its *Paintbox* system
Turner Witted at Bell Labs introduces raytracing

1981

John Whitney Jr and Gary Demos found Digital Productions
Lucasfilm develops the REYES renderer
The Michael Crichton film *Looker* features a virtual character

1982

Lucasfilm introduces particle system, and creates genesis sequence for *Star Trek II: The Wrath of Khan*
Iron premieres, featuring CG created by Triple I, Robert Abel & Associates, MAGI and Digital Effects Incorporated
Tom Wamock founds Adobe
Jim Clark founds Silicon Graphics
Fractal rendering is introduced
A-skeletal animation system is devised at Ohio State
Digital compositing introduced by MAGI
Autodesk is founded
Tom Brigham devises morphing techniques



PICTURES COURTESY OF: © Pixar Animation Studios



PICTURE COURTESY OF: © Pixar Animation Studios

RIGHT John Lasseter made his directorial debut with *Luxo Jr* in 1986. The Oscar-winning short heralded the transformation of Pixar into an independent studio.

TOP RIGHT In *Red's Dream* (1987), Pixar and director John Lasseter continue to refine the idea of rendering inanimate objects with a high degree of detail, and then imbuing them with human-like emotion.

ABOVE Released in 1989, Pixar's *Knickknack* short depicts a snowman determined to escape his snow shaker world. It was to be John Lasseter's last directorial assignment until *Toy Story* six years later.



BOTTOM RIGHT With the arrival of *Geri's Game*, Pixar resumed its commitment to the production of animated shorts. Directed by Jan Pinkava, it showcased *RenderMan*'s new subsurface division capabilities.

PICTURE COURTESY OF: © Pixar Animation Studios



"WE COULD MAKE LIGHT CYCLES AND TANKS... BUT NOT A FULLY ANIMATED CHARACTER"

CARL LUDWIG

that followed." And despite such setbacks, the mid-'80s still proved incredibly productive. Alias, Wavefront and Softimage all made their mark, touting the modelling and animation tools that would bring a degree of standardisation to commercial CG production, and also open up the industry to a wider, more artistically inclined user base.

It also proved a crucial time for the CG staff in the employ of one George Lucas. "George and Marcia Lucas divorced while we were there, Marcia taking half of the fortune," explains Alvy. "That put Lucasfilm into a financial bind. About that same time, I realised that George didn't really know what to do with us."

And so it was that Steve Jobs, who had just parted ways with Apple, bought out the whole team for \$10 million and acted as venture capitalist, enabling Ed and Alvy to co-found their new Pixar studio in 1986. The first fruit of the studio's labours, CG animated short *Luxo Jr*, directed by John Lasseter, provided a tantalising taste of things to come, bagging the studio its first Academy Award (the first for a CG animation). Equally innovative animated shorts *Red's Dream*, *Tin Toy* and *Knickknack* followed over the next three years.

1987 also saw the return of several key MAGI personnel, including Carl Ludwig. "When MAGI folded, myself, Chris

Rushes creates CG music video for Dire Straits' 'Money For Nothing'
Don Greenberg at Cornell University introduces radiosity
Gene Miller with Ken Perlin and Lance Williams with Michael Chou independently develop photographic reflection mapping
Martin Lambie-Nairn creates a CG animation logo for the launch of Channel 4

1983
Silicon Graphics launches the IRIS 1000 workstation
Lance Williams devises mip-mapping
Return Of The Jedi includes CG effects
Alias founded by Stephen Bingham, Nigel McGrath, Susan McKenna and David Springer

1984
The Last Starfighter premieres, featuring CG by Digital Productions
Robert Abel & Associates create the first 3D-second CG ad
Wavefront founded by Mark Sylvester, Bill Kovacs and Larry Borels
Lucasfilm introduces the alpha buffer, distributed raytracing and motion blur
The Polyemus 3Space digitizer and body tracker is introduced by McDonnell Douglas
John Lasseter is recruited by Lucasfilm
Thomas Porter and Tom Duff introduce the compositing algorithm
Lucasfilm premieres 3D CG short *The Adventures of Andre and Wally B* (written by Alvy Ray Smith and John Lasseter) at Siggraph

Cornell University Program of Computer Graphics introduces the 'Cornell Box' for gauging the effectiveness of global illumination algorithms

1985
Channel 4 launches *Max Headroom*
Richard Edlund founds Boss Films
Young Sherlock Holmes features a stained-glass knight created by Lucasfilm
Alias launches spine-based Alias/T software
Lance Williams creates the first animated reflection-mapped CG sequence

1986
Disney utilises CG for *Basil The Great Mouse Detective*
Steve Jobs funds Pixar's break away
Pixar premieres its first CG short, *Luxo Jr*, directed by John Lasseter

RIGHT The movie that launched a thousand careers, *Tron* was actually poorly received on its original 1982 release. The light cycle seen here was created by MAGI using its Synthevision system.

PICTURE COURTESY OF: © Disney



PICTURE COURTESY OF: © Polygram



PICTURE COURTESY OF: © Fox

ABOVE Now best known for its CG animated movies *Antz* and *Shrek*, PDI cut its teeth on smaller-scale CG work, such as the production of this sequence for *The Simpsons*.

TOP MIDDLE Already a staple of the advertising world, computer graphics finally made their mark in the world of the music video in 1986 with Rushes' promo for Dire Straits' 'Money For Nothing'.

Wedge and Eugene Troubetzkoy formed Blue Sky Studios. We naively thought we'd just start a business, get some venture capital and get to work. But then the stock market crashed, so we began working on commercials to fund our way."

CGI Studio, the proprietary rendering system developed by Carl (now vice president of research and development at the studio) and Eugene undoubtedly played a role in the studio's ultimate success. "We already had our code sufficiently developed by the time we started working on the ads, and kept writing as we took on larger and larger projects. We're able to refine it on a daily basis, based on what's needed in a practical working environment."

The same is true at Pixar. Following on from the REYES renderer developed while at Lucasfilm, Dr Catmull and his team further refined their high-level programming system for shader control, dubbing it the *RenderMan* shading language. But whereas Blue Sky has opted to retain exclusive use of its

code, Pixar took a different tack. In 1989, its *RenderMan* software suite was made available for other studios to buy. To this day, *RenderMan* is the renderer of choice for the majority of film and broadcast-based CG studios.

With the appearance of *Willow*, featuring a morphing effect courtesy of George Lucas' Industrial Light & Magic (ILM) in 1988, the love affair was hotting up again. ILM followed this up with the groundbreaking CG water effects of *Abyss* (1989). On the development side, the arrival of 3D Studio from Autodesk brought 3D modelling and animation within the reach of those with smaller budgets. That same year, Pacific Data Images dipped its toes in the waters of digital effects for the first time.

But it was the arrival of another Industrial Light & Magic-powered blockbuster in 1991 that really set the agenda for the '90s. After *Terminator 2*, with its liquid-metal environment-mapped T-1000, a new rule was carved into the Hollywood

ILM creates its own CGI department
Daniel Langlois founds Softimage
Howard The Duck introduces digital wire removal, courtesy of ILM

1987
Craig Reynolds introduces his flocking behaviour algorithm
IBM introduces the VGA graphics format
William Lorenson and Harvey Cline introduce the marching cubes algorithm
Pixar premieres *Red's Dream*
Side Effects founded, introducing procedural animation package PRISMS
Blue Sky Studios founded

1988
Pixar premieres *Tin Toy*
Willow's first movie to feature morphing
Pixar develops the *Computer Animation Paint System* with Disney
Pixar patents its *RenderMan* renderer

1989
Pixar premieres *Knickknack*
Pixar begins selling *RenderMan*
The Abyss features CG effects by ILM

1990
Autodesk launches 3D Studio
Pixar patents point sampling
Newtek launches *Video Toaster*
Pacific Data Images begins digital effects work

Alias launches *Studio* and *Power Animator*
Pixar begins production of CG ad spots

1991
Terminator 2: Judgment Day makes extensive use of CG, created by ILM
Disney's *Beauty & The Beast* includes CG backgrounds
First digital matte painting debuts in *The Young Indiana Jones Chronicles*
Wavefront launches *Dynamation* and *Kinemation*

1992
Tim Burton's *Batman Returns* features flocking CG creature animation
Angel Studios contributes CG to *The Lawnmower Man*
Side Effects adds particles to PRISMS

1993
ILM provide CG dinos for *Jurassic Park*
TV series *Babylon 5* launched
Digital Domain is founded by Scot Ross, Stan Winston and James Cameron
Wavefront acquires NURBS innovator Thompson Digital Images



LEFT BELOW While the video games industry focuses on real-time rendering on limited computing power, it too provides a research-rich environment. Here, an image from id Software's *Doom* (1992). Sprite creatures and environments rendered with the aid of BSP trees power the action.

LEFT And here's a shot of the technology demo for *Doom 3*, expected later this year. All models are high-detail polygon creations, bathed in pixel-based real-time lighting and shadows.



How-To Bible: now no blockbuster would be complete without an audacious computer graphics-laden sequence all its own.

Not to be outdone by the efforts of the other studios springing up to cater for the demands of Hollywood, ILM turned into another showstopper in 1993. Spielberg's *Jurassic Park* became the ultimate advertisement for the possibilities of computer graphics. To this day, no other movie has made the impossible seem real with quite the same dramatic impact.

Development and innovations continued in other quarters, with Scot Ross, James Cameron and Stan Winston forming Digital Domain; Foundation Imaging producing impressive CG footage for the TV series *Babylon 5*, using Amiga home computers; and Mainframe bringing its digitally animated cartoon *ReBoot* to TV. But it took Pixar to steal the limelight back from ILM, with its debut full-length CG-animated movie *Toy Story*. The first of a three picture distribution deal made

with Disney, *Toy Story* went on to become the highest grossing movie of 1995, taking over \$358 million worldwide.

And on the remarkable story goes. ILM continues to dominate the world of digital effects (see *Dragonheart*, *Jumanji*, *Mars Attacks!*, the remastered versions of the original *Star Wars* trilogy, *Episode One: The Phantom Menace*, etc), with Pixar leading the way with an expanding portfolio of multi-million dollar CG movies (*A Bug's Life*, *Toy Story 2* and now *Monsters, Inc.*). Digital Domain has also enjoyed huge success, after proving its worth on *Titanic*, while the likes of Rhythm & Hues, Tippet Studio, Sony Imageworks, PDI/Dreamworks (with its own full-length movies *Antz* and *Shrek*), and Blue Sky (about to premiere its debut CG movie, *Ice Age*) have all gone from strength to strength. Failures, such as Square's *Final Fantasy*, remain a genuine rarity.

UK-based houses have also carved a formidable reputation, with Mill Film, CFC, Double Negative, Moving Picture Company and Cinesite all enjoying success in the movie sector, and FrameStore carving an enviable niche in broadcast. Even Australia and New Zealand now boast successful CG production facilities, not least WETA Digital, the studio responsible for the blinding effects in *The Lord Of The Rings*. And back in software development, Alias/Wavefront, Softimage, Pixar, Side Effects (with *Houdini*) and Newtek (with *LightWave 3D*) have continued to put ever more power in the hands of the artists and animators.

New developments also make the leap from research lab to big screen faster than ever before. Witness the use of image-based rendering with projective texturing in Paul Debevec's *Campanile* animation, released in 1997. The same ideas were used in *The Matrix* less than two years later. And most satisfyingly of all, such new techniques and refinements of existing ideas continue to flow thick and fast. Hardly a month goes by without a studio proffering a more refined method for simulating skin, fur or cloth, while motion-capture, physical simulation, particle systems and procedural effects are all harnessed more effectively with each new project.

As for what happens next... well, that's where regular reading of *3D World* comes in. If the last 20 years are a sign of things to come, just imagine what we can expect to see in 2022!



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For more on the milestone events over the last three decades, check out our regular Looking Back section on page 94. In a future issue, Alvy Ray Smith will also talk exclusively about his work at Lucasfilm and Pixar, and reveal his thoughts on the future of 3D graphics.

Mark Ramshaw is a regular contributor to *3D World*.

1994	Microsoft buys Softimage Doom and Ultima Underworld popularise texture-mapped 3D in computer gaming Mainframe's ReBoot TV series one airs True Lies premieres, with effects by Digital Domain
1995	Pixar premieres Toy Story Silicon Graphics buys Alias and Wavefront, merging the two Side Effects adds NURBS to PRISMS Newtek launches LightWave 3D Species utilises motion-capture for creature animation
1996	Side Effects launches Houdini Dragonheart features a stunning CG dragon, courtesy of ILM
1997	James Cameron's Titanic premieres, featuring CG primarily by Digital Domain Paul Debevec premieres Campanile Pixar premieres Jan Pinkava's CG short, Geri's Game, featuring RenderMan's new subdivision surface support Special editions of Star Wars, The Empire Strikes Back, and Return Of The Jedi add CG effects to the original movies
1998	Pixar premieres A Bug's Life PDI makes its full-length movie debut with Antz Avid buys Softimage Alias/Wavefront launches Maya
1999	Pixar premieres Toy Story 2 Star Wars Episode One: The Phantom Menace premieres, complete with digital actors Sony Pictures Imageworks premieres Stuart Little Rhythm & Hues merges with VFX Paul Debevec premieres the Fiat Lux short, demonstrating high dynamic range image-based lighting The Matrix premieres, featuring 'bullet time' CG-based sequences Autodesk creates Discreet division
2000	Disney premieres Dinosaur FrameStore creates CG dinosaurs for TV series Walking with Dinosaurs 3D World launches X-Men premieres, featuring high dynamic range lighting techniques by Digital Domain

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opto-psycho-tropic pop video

Pop videos are still a long way off from the virtual art-entertainment they could be – if only the moneymakers had a vision

BY CHRIS EVERARD

"TODAY," THEY SAY, "I SAW IMAGES WHICH MADE MY WHOLE LIFE WORTH LIVING..."

When people visit my house, conversation invariably turns towards the two-metre tall motorised satellite dishes in my back garden. "No, I'm not into space astronomy," I tell them – "These dishes enable me to access 1,014 TV stations – and raw Space Shuttle downfeeds." Their sad little puffy eyes brighten up at the prospect of channel-zapping through what could be their most exciting TV experience yet. However, elation soon turns to shock when I tell them it's all crap: "The only thing it comes in handy for is porn and pop – oh, and when you want to watch Colonel Gaddafi's weekly Public Address Broadcast on Libyan TV."

The pop video is the mainstay of modern cheapo-TV. The etheric blanket of ascended spirits enveloping planet Earth is



polluted with acres of "MTV" stations – there's the soul-less German VIVA channel, two sad French music video stations, the awful Country Music Channel, "Z" for Bollywood Bangra Babes, and about another 20 or so MTV-lookalikes (including one from Moscow which features the Russian version of Whispering Bob Harris). But pop videos are slotted into many of the sports channels – and even foreign 'All News All Day' channels pad their schedules out with them. At best, I'd describe this

atrocious output as "misguided programming" but after 27 years of digesting such rubbish, I've come to a much more sinister conclusion...

They're lying to us, they're moulding our perceptions, they're using eroticised children to eroticise more children and then getting them to fill in secret classroom census forms so the local masons know which parents skin-up in front of their kids. Read Alex Constantine's book *Psychic Dictatorship* and you'll learn that the most basic form of mind control is repetition.

And repetition is what the modern pop video is all about. Today's so called 'pop stars' are agents of the illuminati, pumping and gyrating their little torsos, regurgitating relationship-orientated melodies which make every six-year-old feel like an outcast if they haven't got at least two boy/girlfriends with a string of broken relationships behind them.

But, I tell you, the really sick thing about this whole 'pop video' world is that if I walk into any of the major or corporatised indie labels with a pop video I've made which isn't 'performance-orientated' (i.e. dancers, studio set and the lead singer in-er-face for every frame), they give me a funny look. Especially when I don't insert a single close-up of the lead singer.

However, they invariably love what they see. Their repressed subconscious leaps for joy at my strobed 3D wonderlands, populated by eerie *Poser*-modelled aliens who groove to the music, slo-mo napalm, Reverend Frank E Stranges preaching about flying saucers, 1920s cocaine ads, crop circles being made by small shiny silver balls, 3D wormhole 'death rides', exploding planets, photos of ghosts...

Their pale faces mask a brain in shock. "Today," they say to themselves, "I saw images which made my whole life worth living..."

But then the corporate mask returns: "I'm sorry, but I really do think we should have a close-up of the lead singer every time they sing the hookline." I nod, do the cut and deliver another diluted masterpiece. However, I know that I've done my job perfectly. I've used this life masquerading as a Pop Video & Documentary Film Maker to infiltrate the upper echelons of Big Business and expand the horizons of a Senior Executive. I console myself by saying, "We'll get there – just one step at a time..."

CHRIS EVERARD is one of the founding directors of GBC – the Global Broadcasting Corporation – which owns The Enigma Channel, the world's first on-demand global TV station broadcasting documentaries on the internet (www.enigmaTV.com).

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'Knight on Ship' image from the movie 'A Brief Good Knight' by Ed Taylor and Damien Johnson (also animators of Tiny Planets). Tunic, sail, flag and sea all animated with CLOTH.

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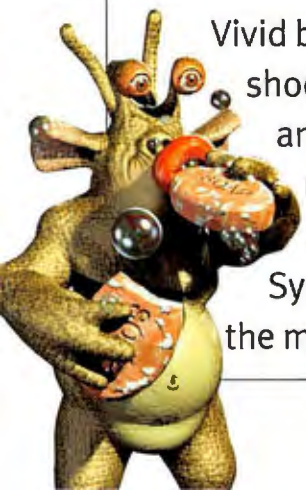
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SYNTHETIC DIMENSIONS

Doing the eclectic electric



Vivid book illustrations, blood-and-gore shoot-'em-ups, mad Iron Maiden videos, and a 3D TV show featuring soap-eating moon-based dwellers and obese, three-eyed karaoke-singing aliens.

Synthetic Dimensions doesn't know the meaning of same old, same old **BY SUSAN WRIGHT**

Talking to Synthetic Dimensions can be a little on the strange side... "So Brian, the green alien guy, wants to take over the world, but he can't do stairs. His legs are too short and stubby," explains company director Kevin Bulmer. The founder of Synthetic Dimensions is having fun fleshing out the smorgasbord of characters in *Astro Knights*, a 3D animated TV series his company has been working on for the last two years. "Stan, a used car salesman type guy, is showing Brian around a selection of big battleships," he continues, "and everything to help him with his quest. Except everything he's showing is too expensive..."

Bulmer knows *Astro Knights* in intimate detail because he helped develop the concept from scratch, wrote many of the plot lines, and was hands-on creating the look of the characters



"WE'RE STRIVING TO REDUCE THE QUALITY GAP BETWEEN TV AND MOVIE PRODUCTIONS"



through many hours of sketching and brainstorming with the rest of the Synthetic Dimensions team. The project came originally from Jim Driscoll, now the company chairman and a creative businessman who made a small fortune with his hugely successful TV series, *The Shoe People*, back in the '80s. Driscoll came up with the idea of *Astro Knights*, a play on the word astronauts, after assuming the post of Chairman of the Young Astronauts Commission (European arm) – an organisation that was established by Ronald Reagan and aims to encourage children's interest in science and space. Instead of opting for continual re-runs of *Star Wars*, he dreamed up *Astro Knights*.

Driscoll first took the idea to a Californian animation company who came up with a concept that, ultimately, wasn't successful. Driscoll then met Bulmer, who was casting around for extra investment and new projects for Synthetic Dimensions. The two clicked and Bulmer got to work developing the current concept of a school on the moon that combines Earth folks with an assorted mix of stubby-legged, karaoke-singing, soap-eating aliens. At the centre of the medley is Irwin.

"Irwin lives on the edge of the dark side of the moon, near the frozen ice particles. He can melt these for water. It's important that the science in *Astro Knights* is feasible..." Bulmer is brimming with enthusiasm for the wayward characters he's been modelling and texturing. "He also eats soap. He can't get enough of it. The people on the moonbase have to constantly order new crates of soap from Earth. Irwin is also well into dance music..."

VIDEO GAME HISTORY

Writing, drawing, modelling – aside from soap-eating, this is territory that Bulmer knows well. He can talk about every inch in the growth of Synthetic Dimensions because he founded it. He knows every hologram, computer game, crazy 3D Iron Maiden video, and model that the company has ever designed. The company began life in 1985 as a small graphics design operation. Bulmer was an illustrator and he and his co-founder



FACTFILE

FORMED 1985

EMPLOYEES 25

BASED Stourbridge, UK

WEB www.syndime.com

CONTACT 01384 358 328

CREDITS *Astro Knights*, *Gauntlet II*, *Golden Axe*, *Corporation*, *Legends of Valour*, *Perfect Assassin*, *Ed Hunter*, *Angel & The Gambler* (pop promo for Iron Maiden)



OPPOSITE The *Astro Knights* line-up (from left to right): leader Mike, Caiman, cryptic soap-eating Irwin, remote head Chip and alien mechanic Kyla.

ABOVE LEFT Brian (right) plots with aliens Meany and Miny.

TOP Living on the Moon isn't all laser fights or exploding brains, you know. Sometimes people sit down, drink latte and *chat*...

ABOVE The Apollo Bar: a Moonbase venue where the Academy students can chill out.



Synthetic Dimensions used its own proprietary apps to model and render the *Astro Knights* characters – and then imported the files into *Maya* for an external studio to animate. Here you can see the impressive results.



produced magazine covers, illustrated children's books and created playing pieces for role-playing games. He was also into programming and developing small utilities for enabling CG animations. And all at a time when pop stars had bad hair and having lots of computer memory was a far-off fantasy.

Then came the move into video games. Synthetic Dimensions is a company steeped in 3D history. It began translating US titles for use on machines like the Atari ST and Amiga, before launching into the memory-intensive and more creatively

"ASTRO KNIGHTS ISN'T SOME CYNICAL SATURDAY MORNING FARE THAT IS INSTANTLY FORGETTABLE"

challenging task of developing original titles from scratch. Synthetic's first release, *Corporation*, was a first-person 3D shoot-'em-up released in 1989 and featured genetically-engineered monsters gone mad. It was the first game to feature real-time sprite-scaling, Bulmer points out. Later, the team pushed back the envelope again with *Legends of Valour*, which boasted one of the first real-time textured polygon 3D environments.

The company has effectively evolved with the technology, and developed its own proprietary software en route. The most public of these is Syndimation, which, according to Bulmer, enables his team to "convert any ordinary flat picture, or still from a movie or video, into a 3D environment." The technology was used to create holographic promotional material for Pixar's *Toy Story 2* and *A Bug's Life*. It also helped create the 3D environment of the Iron Maiden video game, *Ed Hunter*.

Yes, it seems everyone has to go through a heavy metal phase at some time in their life and Synthetic Dimensions is no exception. For two years in the mid-'90s the team dedicated much of its waking time to creating Iron Maiden material, including an album cover, video, holographic images and *Ed Hunter* – a game that took the player on a quest to find the heads of each Iron Maiden band member while tackling zombies and different places in time along the way. Bulmer, not a fan of the band before they became a client, laughs when he points out that he can now name every Iron Maiden track and tell you what album it's on. The things people do for work... Given its





ABOVE *Astro Knights* may be a fictional series, but its creators were eager to ensure that real-world physics was adhered to throughout.

LEFT Bibliophile Mike is a bit dizzy in a crisis, so Kyla is often forced to take over.

BELOW Brian, the self-appointed Dark Overlord of the cosmos, has some powerful toys at his disposal.



pedigree, then, it might seem that a 3D animated TV series like *Astro Knights* is something of a departure for Synthetic. It's actually a natural step forward, building on the company's core strengths: dreaming up a concept, writing stories, defining characters, and then doing the hard graft turning the ideas into living, textured models. And although the show's models and sets have been built by Synthetic, the animation itself will be completed by a studio outside the UK.

MAYA STANDARDS

The group effected all the modelling and rendering using its own unique software, but has only just finished translating the workload into *Maya*. "It makes sense because *Maya* has become such an industry standard," explains Bulmer. "We can go to any animation studio, drop off our models, and they should be able to pick up the storyboards and run with it right away." The move to *Maya* also enabled the team to add some built-in features. Expressions were written for many characters so that the models can deal with many of the animation requirements automatically.

Looking at the trailer, the result is darkly comic – a curious Tim Burton spin on Wallace & Gromit, but without the deft touches or big-budget slickness of either. "We're striving to reduce the quality gap between TV and movie productions, [but] there's no way we can look like *Shrek* or *Toy Story 2* on a TV budget," admits Bulmer candidly. "We have to produce 13 hours

of show for a fraction of the budget they spent on 90 minutes." Much of Bulmer's work has therefore been to optimise the models to maximise memory space and increase render times, but without compromising on quality.

So what will make *Astro Knights* stand out from the Saturday morning cartoon brigade? "The detail, texture, atmosphere and humour and the quality of the stories," affirms Bulmer. "This isn't some cynical Saturday morning fare that is instantly forgettable. Focus group tests show that it appeals to a broad age-range and the humour also works for an adult audience."

Deals and negotiations are currently underway, but *Astro Knights* should hit terrestrial TV sometime next year. Clearly, this isn't some fly-by-night operation winging it on chance. Much work has gone into creating a fully fleshed-out commercial product that's more than simply a TV series.

"We have an international co-production partner splitting the development cost," explains Bulmer. "The show is also being developed as a comic and computer game – and other discussions are happening right now. This means the risk factor has been reduced considerably. It's also a good thing because potential licensees can see that the property has legs. Their investment in the licence will be supported in several markets and they aren't alone in having confidence in *Astro Knights*."

So far, so good. Now that the company is listed on AIM, Bulmer can't elaborate in great detail about the company's future plans. However, it does have a few more kids shows ready to deliver through the development pipeline: *PC Pepper*, an animated show for pre-school children that's been developed by Rob Lee, who was responsible for flying Super Ted across our screens, and the intriguingly titled *Cornish Riviera Pasties*. These shows aren't 3D in the same way as *Astro Knights*, but, says Bulmer, they do make use of 3D technology behind the scenes – to enable different perspective shifts, for example.

Bulmer acknowledges that Synthetic Dimensions has traditionally focused on the older teenage and adult market. That's where its storytelling strength lies. At the moment, the company is also building models for another programme that can't be named just yet. It's all hush, hush, of course – but at least Synthetic Dimensions is busy, busy, busy.





PROVE YOUR metal

Having trouble forging the perfect metal? Forget the chrome gleams and perfect reflections of yore; this is the real deal – a step-by-step guide to moulding the best metal virtual money can buy

BY SIMON DANAHER

All the images for this tutorial can be found on the cover CD



Along with glass, creating good metallic surfaces can be tricky in 3D. 3D renders have a tendency to look a little plastic, so if you want your subject to look halfway between metal and plastic, it's important to understand a metal's defining properties – and how these relate to the controls in a 3D program. Over the following pages, we'll guide you through the basics, and also touch on the importance of attributes like diffuse and specular shading. Want to make your metal something special? Then read on...



Simon Danaher is a Mac fiend who covers the market in 3D-related reviews and tutorials, and has written many articles for 3D World.



STEP ONE the basics

Simple metal surfaces – and what to avoid!



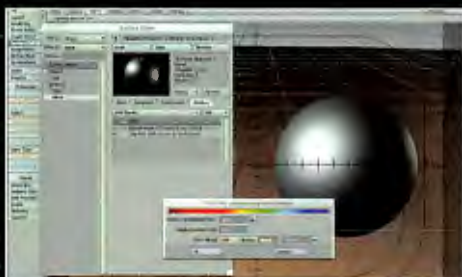
1 A surface's material definition has three primary shading attributes: Diffuse, Ambient (or shadow area) and Specular. The Diffuse and Specular parameters are of key importance here, helping to create a realistic metallic effect using basic Phong Shading.



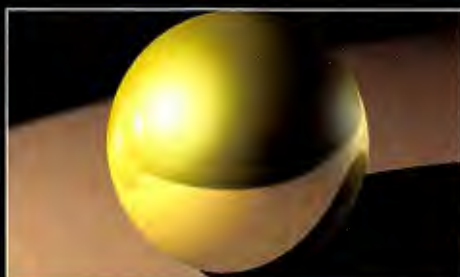
2 As you can see, basic Phong materials tend to look plastic with hard, bright specular highlights and no diffuse falloff. Simply adding reflectivity to the material does not create a decent metal surface.



3 Diffuse shading consists of two components: colour and brightness. In some 3D packages these appear as separate channels; in others they're integrated, although there is some degree of functional overlap. For example, a black coloured material at 100 per cent brightness behaves the same as a white one with zero per cent brightness.



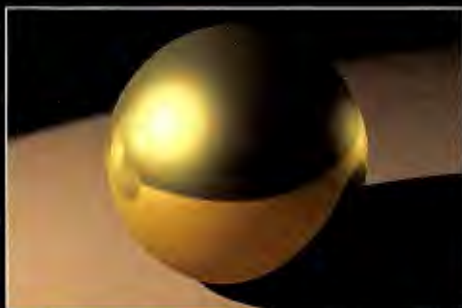
4 The sphere on the right has a special 'thin film' shader applied (exaggerated), which produces a Fresnel-style coloured gradient. You can easily reproduce this without a special shader using gradients and Fresnel falloff. The ball on the right in the previous step looks more organic and natural because most steel objects have oil on them.



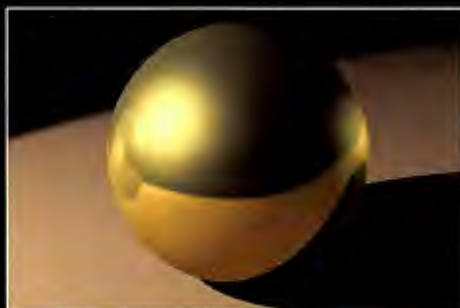
5 Remember, we're not dealing with Platonic idealism here, but what real objects look like. The mistake that most people make is to recreate their concept of, for example gold, rather than reproducing what they actually see. Hence, for gold you get a yellow shiny reflective surface, which gold is often nothing like.



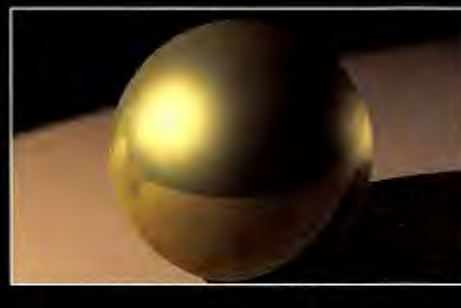
6 If you look at a piece of real gold, it's often not particularly yellow. The diffuse portion of the surface is actually quite desaturated; more a brownish yellow colour than anything. The specular reflections (i.e. reflections of bright light sources in real objects) are also tinted the same as the surface and rarely white.*



7 Most metal objects we see around us aren't that reflective – the effect is dulled or blurred unless the surface is finely polished. With gold, for instance, the surface shouldn't be CG perfect but rougher – even for a relatively shiny surface. Here we've added fractal noise to the Bump channel.



8 This disrupts the reflection and the specular effect. Using fine-grained fractal noise and a low-Bump setting can also produce subtly dulled or blurry reflections. Here we've further disrupted the specular channel with fractal noise – specular highlights are rarely pure in reality.



9 Here you can see the effect of that all-important Fresnel. This subtly attenuates the reflectivity of the surface, depending on its angle to the camera. We've set it at 70 per cent at the edge and 40 per cent in the centre. There's also a fractal texture providing some noise to the reflectivity. The result is a more solid-looking believable gold ball.

* Note, however, that bright white speculars can occur when very bright lights produce blown-out specular highlights.

STEP TWO hot metal

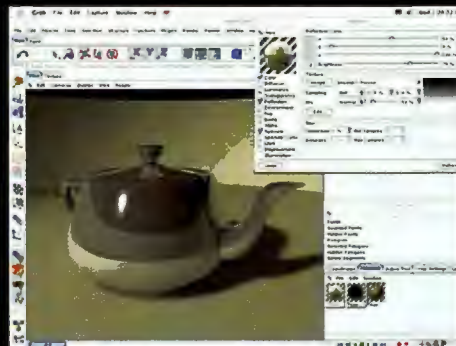
All that glisters is not gold...



2 It's all too easy to set a channel to its maximum setting when making chrome, which risks surfaces that blow out easily. A good rule of thumb is to keep the diffuse and reflection percentages summed to 100 per cent. For example, if Diffuse is set to 55 per cent the Reflection can be no higher than 45 per cent. The ball on the right obeys this rule; the other does not.



2 Remember that as reflectivity increases, Diffuse brightness decreases as per the rule in stage one. A 100 per cent reflective object should have no diffuse brightness. In reality, no object is ever 100 per cent reflective though. Chrome is a good example. Here the object has 10 per cent diffuse shading, 90 per cent reflection.



3 You can go for quite a wide range of chrome looks, depending on the ratio of diffuse to reflection you use. To achieve creamy, soft, chrome-like surfaces opt for more diffuse shading, perhaps even some colour.



4 The best chrome surfaces get one aspect absolutely spot-on: reflection. If your scene is dense and surrounds the chrome object, there's not much of a problem, except you can see how ridiculous a near fully reflective object appears.



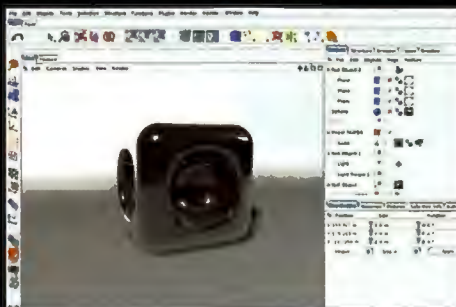
5 Toning down the reflectivity of chrome makes the originally gleaming subject appear more believable, especially in these circumstances. A bit of noise in Bump and Reflection, plus some Fresnel drop-off, helps too.



6 If you want 100 per cent accuracy, turn off the Specular channel for any chrome (or other highly reflective) object. Specular highlights are really a fake, so achieve more realism by making your light sources render in reflections. See? This time the lights have visible cones causing the highlights.



7 In a studio-style environment, you can use special reflection objects, panels with luminous materials placed around the scene, to enhance your image. These mimic the light-diffusion devices used by photographers and help to create that chrome-photographed-in-a-studio look. Here a large single overhead panel helps create a striking reflection effect.



8 Rendering chrome objects in isolation is tricky because there's little (or nothing) to reflect. Environment maps are okay for background objects, but can look fake under close scrutiny. Even a simple photographer's style backdrop can help fill the void. This one has been created by simply lathing a spline.



9 If you want, you can create a custom-made environment that contains shapes like light-diffusers, etc., to mimic a studio reflection. Admittedly, it can be tricky to control and sometimes looks messy, but at least it's quick and you can reuse the map elsewhere whenever you want.



STEP THREE further improvements

Making the most of Diffuse and Specular shading



1 As we've seen with gold, the specular highlights of metals tend to take on the colour of the surface material itself. This is a general rule of thumb for metallic objects. However, pay attention to the shape of the specular highlights, depending on the quality of your metal's surface. Here are two examples – one with a carefully set specular; the other without.



2 For rough metal, use a wide specular area and low Diffuse. However, in some packages widening the highlight isn't enough, resulting in a dull non-metallic look. In some cases, especially with a low Diffuse level, you'll need to raise the specular above 100 per cent. In *Cinema 4D* and here in *LightWave*, for example, you can do this without specular blowout.



3 To take things to the extreme, you can even set the Diffuse to zero and shade the whole surface using a wide 'hot' specular. The result may not be wholly accurate, admittedly, but it screams metal. If you have difficulty obtaining a metal look, this is good place to start, then up the Diffuse and drop the specular until it looks right.



4 Some 3D programs enable you to adjust the Diffuse fall-off. This is also a particularly good tip for metals. On the left is a normally shaded object with metallic specular; on the right a similar material but with the Diffuse drop-off increased.



5 Increasing the drop-off means that the Diffuse shading falls off more quickly into the shadow area than normal. This is a good way to achieve a metallic look, although it's easily overdone. Here are progressively larger fall-off values using *ElectricImage Universe*.



6 If your program doesn't have a Diffuse drop-off feature, you can fake it using a gradient/ramp, as in *LightWave* or *Maya*. Here we've added a Gradient layer set with Light Incidence as the input parameter in *LightWave*. To complicate matters a little, you need one for each light.



7 If you set the start colour to transparent (in *LightWave*, you decrease the Alpha level of the colour; in another app you could set the blending mode of the gradient to Multiply, etc.) and the end colour to black, you can move the black point along the gradient to set the fall-off. The main Diffuse channel level then still works to control the overall Diffuse brightness. It's a bit of a fudge, but it can work in certain situations.



8 So it's the subtle balance between Specular and Diffuse shading that helps to sell a metallic surface. There are many types of metal, though, each with its own look. Factor in the different levels of finish that a metal object can have and you've got a wide range of looks to choose from. If you're lucky, your 3D program supports different shading models, such as Blinn. Here are two objects: one with Phong (left); the other with Blinn.



9 3D artists often choose Blinn when creating metals because of the different look of the specular highlight, which is basically a better starting point for attaining a wide metallic specular lustre. Phong shading is just as good, but requires more work to achieve good results. As with any object, models with bevelled edges help catch highlights.

STEP FOUR texture and grunge

turning the screw



1 Getting the underlying surface material right is just the start of the process. Most metals have some sort of texture, unless they're highly polished, chromed, etc. Even shiny objects – a nickel-plated screw, which is shiny on close inspection, for example – is quite rough. Rarely, if ever, will something like a screw be finished to mirror-smooth perfection.



2 First, apply a good base Bump map, which provides a suitable base layer of noise. A fractal will do fine, but set the scale low to simulate the grain of metal. This, as we've seen before, disrupts the reflection of the surface without resorting to time-consuming ray-traced blurring effects, but can be quite coarse.



3 Here, we've used the Crumple shader in *LightWave*. If it looks too much like Hammerite, reduce the intensity and the scale some more. Now add a larger scale and sparser noise Bump layer, and use a Perlin noise shader (you can create this texture as an image map if you wish). The point is to break up the uniform fine grain with some dents.



4 Adjust these depending how gnarled you want the metal surface to be. Next, you need to dirty up the surface. The specular highlights are far too clean, so use another noise map or shader in the Specular channel to break them up.



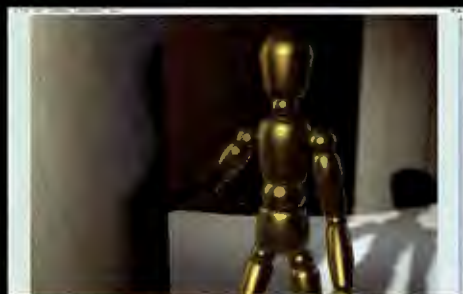
5 The reflection is attenuated using Fresnel fall-off. It's a subtle effect, because you still want the screw to look shiny. Now it's time to tidy up the Bump noise. The shank on a real screw is a lot rougher than anything else.



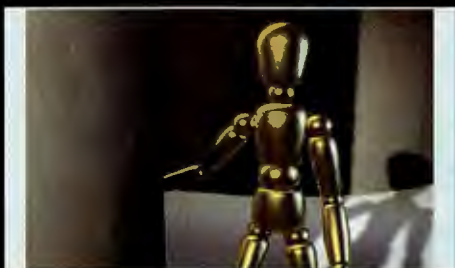
6 And here's the final result. If you're smart, you'll have created separate materials for each part of an object like this beforehand.

STEP FIVE more light!

Render that Specular spectacular



1 Sometimes the basic lighting set-up for your scene isn't sufficient to provide enough specular oomph, to make a metal like gold really sparkle. Here's our scene, which looks pretty good, but we want the gold to have a bit more zing.



2 Here we've added two point lights, but turned off their Diffuse illumination so that they only affect the specular highlights of the object. This enables you to control the Specular brightness without messing with the material or fouling the scene's Diffuse lighting.



3 If you have the option, try changing the light type. In this case we've changed the point lights to linear (Tube) lights. The result is a slightly different, elongated specular highlight which functions almost like a rim light, adding edge detail to the metal object.

black hawk down

At the heart of Ridley Scott's epic new war movie are some stunning CG effects, courtesy of *Gladiator* effects house Mill Film **BY MARK RAMSHAW**

From his debut film *The Duellists*, through *Alien*, *Blade Runner*, *Legend*, *Black Rain* and *White Squall*, every one of Ridley Scott's films has been shot through with a rare visual artistry. Few directors can match his flair for setting the mood through colour and lighting, and as *Gladiator* so effectively demonstrated, few have such a keen understanding of digital technology as an effective storytelling device.

Black Hawk Down sees him prove that point once again. Already a number one box office hit in the USA, this controversial retelling of 1993's disastrous battle between US soldiers on a United Nations peacekeeping mission and hordes of Somali militia, finds him re-united with *Gladiator* special effects gurus Mill Film. Contributing some 94 shots to the production, Mill's work is remarkable for its invisibility. Most moviegoers simply won't be aware that CG effects play such a prominent role in this intense war film.

Work on the effects kicked off as soon as shooting began, with Mill Film's visual effects supervisor Tim Burke and several of his team working with Ridley on location in Morocco, doing layout, planning shots, obtaining location data and performing preliminary texture work. When shooting wrapped some four months later, the team of around 50 people (20 working on 2D; 30 on 3D) had just another four months to complete their work,

TOP RIGHT After working closely with Ridley Scott on swords 'n' sandals epic *Gladiator*, Mill Film has now created the visual effects at the heart of the director's first war movie. Both helicopter and crew in this shot are completely digital.

BELOW Even scenes shot using the two Black Hawk helicopters on loan from the military are subject to a fair amount of post-work. Here dust and debris effects turn a street scene into something less clean looking.

using a combination of *Maya*, *RenderMan* and *3ds max*. Two sequences proved particularly challenging: one involving a huge CG crowd; another a spectacular helicopter crash. Each scene posed its own set of challenges, and often demanded a fair degree of R&D to develop and refine proprietary code.

ORGANISED CHAOS

"For the crowd sequence we have a shot where you can see thousands of people running up a hill, almost all of which are computer-generated," explains Olcun Tan, lead technical director on the project. "It's created using motion-capture data, with tools written in-house that enable us to blend smoothly between the datasets. That way we can have a character smoothly go from walking to running, then slow down again, or whatever else is needed. The real extras in the scene are also running, slowing down and changing their behaviour, so we had to work alongside that."

The process also involved giving the digital crowd convincing flocking behaviours. "With most flocking systems, all the agents are doing the same sort of thing, but we wanted a much more natural look," explains Olcun. "Our flocking system tools, which are based on *Maya*'s particle system and the *Maya* API, give a good range of simple behaviour commands. Characters have a simulated field of view and a kind of a brain, so they can work out where they are in the scene. We also build in obstacles to help direct them, and also to ensure they don't intersect with each other or the live characters."

Each character in the crowd is actually a full 3D model, complete with a kind of cloth simulation system. "At first we tried a full-blown clothing system, but it was just too expensive with this many characters, so we came up with one that blends between the different cloth movements, using textures collected from the costumes of the actors and extras on set."

The other major challenge with the crowd scene involved dealing with the awkward geography of the hillside itself. Measuring around 800 by 800 metres square, there's a fall-off of





ABOVE The original live shot of that troublesome hillside, with just a few extras down on the ground. From here, the land looks quite level...



ABOVE But from this angle you can see clearly just how steep the incline is, and how uneven the surface.



ABOVE Back in London, photogrammetry and height map data help Mill Film build a polygon overlay of the ground. A flocking system then populates the scene.



ABOVE The finished shot, with digital crowd elements blending perfectly with live actors and the original scene's topography.



about 100 metres overall. "You don't immediately see it in the view from the helicopter because of the perspective," explains Olcun, "but it's quite steep and very irregular and 'noisy'. With this degree of surface variation, it'd be almost impossible to fix the CG crowd to the ground using regular camera tracking techniques. Even from the remote helicopter view used in the final sequence, there'd be visible floating.

"Quite late in the day it became clear we needed to organise some telemetry measurements, so we just decided to do it

ourselves. The US military have that sort of data, but it's not so easy for a company in London to get that sort of information from them. It wouldn't be a good idea for them to hand out detailed landscape data for a place like Morocco! Instead, we got down on set and measured the whole hillside, dividing it up to collecting point information across the whole area. I then needed to find a way of reconstructing it back in London as a polygonal hillside, and came up with the idea of getting shots taken from a helicopter, taking 2K images at different positions

GROUND WORK

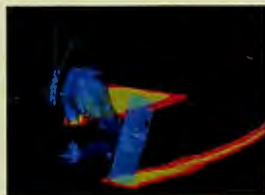
A mixture of CG and live effects combine to create a powerful crash sequence



The CG



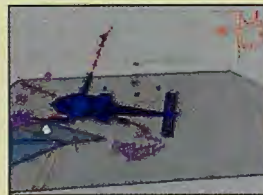
Here the blade dynamics and ground effects are calculated as the Black Hawk helicopter smashes into the ground.



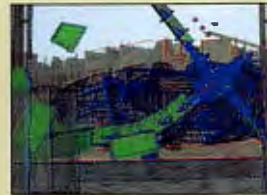
The break-up is handled using a *Maya* plug-in. It's an expanded version of a tool developed for the studio's work on *Tomb Raider*.



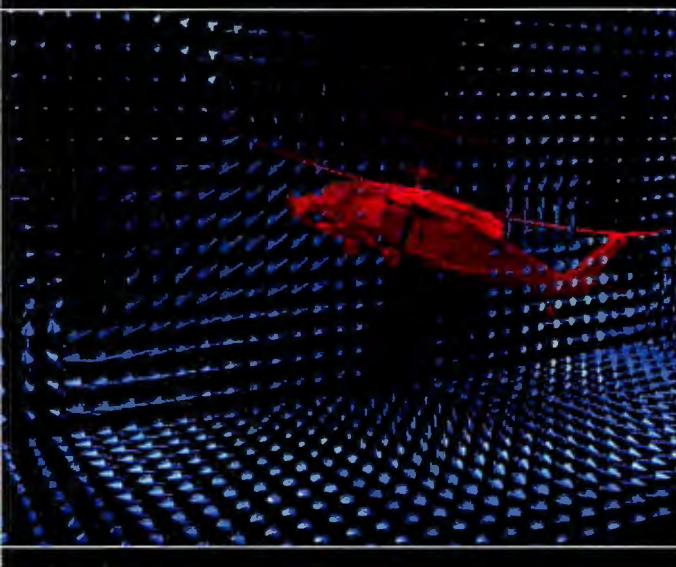
Another in-house system is used for collision detection to render image maps where the helicopter meets the ground.



A view of the simulation in progress, with survey information from the set indicated by the red guidelines.



Here's a closer view of the blades as they bend and break using the event-based Dynamic system.



LEFT A turbulence flow field was used to help generate dust effects as the helicopter comes close to the ground. "It's a kind of fluid dynamics calculation, programmed by Mill Film's technical director Alex Rothwell in *Maya*," explains Olcun.

FACTFILE

FORMED 1997 (Parent company Mill was founded in 1990)

EMPLOYEES 170

BASED 40-41 Great Marlborough Street, London W1F 7JQ

WEB www.millfilm.co.uk

CONTACT 020 7287 4041

CREDITS *Seven Years in Tibet* (1997), *The Avengers* (1998), *Shakespeare In Love* (1998), *Enemy Of The State* (1998), *Babe: Pig In The City* (1998), *Pitch Black* (2000), *Gladiator* (2000), *Tomb Raider* (2001), *Harry Potter & The Philosopher's Stone* (2001), *Hannibal* (2001), *Enigma* (2001), *Chocolat* (2001), *Cats & Dogs* (2001), *A Knight's Tale* (2001), *Band Of Brothers* (2001), *The Count Of Monte Cristo* (2002), *Pluto Nash* (2002)

AWARDS Winner of the Academy Award Oscar for Best Visual Effects for *Gladiator* (2000)

Models &
Live Action

In addition to the CG effects, the Mill Motion Control division also constructed a one-sixth scale physical Black Hawk model.



Mounted to a motion control model mover rig, it's animated using Polar data converted from *Maya*'s Cartesian coordinates.

"HE ENVISAGED THE HELICOPTER LIKE A DYING ELEPHANT, WITH BLADES FALTERING..."

and using this with the height survey data to build the model from scratch."

With all these elements working together, Mill Film team could export everything out from *Maya* to *RenderMan* as a dynamic database, with all blending and important calculations handled automatically.

"It was then just a matter of running the simulation to build up the scene," says Olcun. Of course, creating the scene using a simulation-based method did require that everything be set up just right in the first instance: "If you've got thousands of characters in the scene there's just no way you can go in and start modifying individual character behaviour."

BREAKING POINT

The second major CG-based sequence to challenge the effects team depicts the loss of two UH-60 Black Hawk helicopters in the heart of Mogadishu, the Somali capital. This is a pivotal point in the movie – from this point on the US soldiers are no longer concerned with capturing the lieutenants of a renegade warlord. Instead, they're simply fighting for their lives, battling against an enemy attacking from all sides for 18 agonising hours.

All models, including that of the Black Hawk helicopter, were created using NURBS (primarily using *Power Animator* for the

modelling work), the artists working from photographic and book reference rather than actual aircraft plans. "The military wouldn't provide them," adds Olcun.

Bizarrely, military restrictions also hindered attempts to obtain textures from one of the Black Hawk helicopters on set. "I was going to take some photos of one of the helicopters for textures," remembers Olcun, "but was blocked by a soldier who wouldn't let us take any shots without permission. It was all very militarily minded down there. The pilots were even always in the helicopter, on the alert. I'm sure if they needed to go into real combat it wouldn't have been a problem."

The scene also required CG crewmembers, one of whom falls out of the copter as it crashes and is crushed underneath. But as the faces of the crew are obscured in these scenes Mill's artists were able to hand-reconstruct these from photos of the various actors with relative ease.

The modelling and animation of the helicopter itself proved far more complex. It required a fully working rotor blade mechanism, blades that buckle and smash, and full interaction between the ground and helicopter as it crashes into the dirt. Again, the effects team opted for a simulation-based solution.

"For something like the blades hitting the ground and breaking apart, you don't really want to be animating by hand," reasons Olcun. "It's hard enough getting it to look



The resulting animation provides live dirt and dust effects to supplement those created digitally.



More blue-screen footage is taken for a chair that will be ripped apart by flying pieces of the CG blade.



The other live element required is the live background plate from the shoot in Morocco.

physically correct for one piece, never mind 50. You could spend a whole month on it, then if the director doesn't like something and it needs changing you've got to do the whole thing again. So it was really necessary to come up with a pipeline to handle all those calculations as a full simulation. So if the director decides he wants a piece of blade colliding with a car, it's just a matter of re-simulating."

BREAK IT DOWN FURTHER

At its core, the crash simulation is a heavily expanded version of a system for dynamically breaking down objects into independent chunks, originally developed by Olcun for *Tomb Raider* and *Enemy At The Gates*.

"It means that as a blade hits something it automatically breaks apart into smaller components, each of which can then go on to collide and smash any rigid model object which we also define as component pieces. So as the collision takes place,

TOP Only one of these helicopters is real. The airbase and convoy of ground vehicles are also digital additions.

the simulation takes over, breaking the object up automatically, calculating the way everything breaks and hits everything else. You can just go off for a cup of coffee, come back and if you don't like the results just change the parameters, maybe adding more gravity or animating the blades faster, and re-simulate. Or if you want a wall that breaks up, you just add it to the scene, and the system does the rest. All the calculations are performed using proxy objects, and then replaced with the high-resolution geometry for the final render. Otherwise, we'd spend 20 minutes exporting one frame from *Maya* to *RenderMan*, never mind the time to actually render it."

More automation comes into play in the way the various objects kick up dust and affect the ground underneath. "We re-wrote the *RenderMan* pipeline to accommodate our own collision system to deal with the crash," says Olcun. "As the helicopter hits the ground it can generate particles automatically, making use of a number of quite complex dirt effects we've written. It's a little like the water particle effects used by ILM in *The Perfect Storm*, with everything generated from the correct point on the surface of the body or wherever."

This then works in conjunction with a custom-written ground deformation system, which calculates displacement maps for the intersections with the ground and the crashing Black Hawk Helicopter. "Again, it means any changes to the helicopter crash don't require us to alter the ground animation by hand. The pipeline does it all automatically for you."

Once the CG crash itself was approved by Scott and his team, Mill Film then constructed a model mover rig, and a one-sixth scale physical helicopter model. This was used to obtain live dust and ground effects, so the final sequence uses a good combination of both.

"Ridley wanted a crash where everything else in the movie could be built on top of it, and because it's the key scene he really wanted something stylised. He envisaged the helicopter like a dying elephant, with blades faltering and slowing down with a definite rhythm. And he wanted real control over all the elements to achieve that, which meant finding a way of making the whole sequence as selectable and modifiable as possible."

The effort was clearly worth it, resulting not only in impressively seamless effects, but also ensuring that ultimate control genuinely remained in the director's hands. With Ridley Scott at the helm, that could only be a good thing.



Black Hawk Down is now in cinemas nationwide. Mill Film is currently working on effects for the next *Harry Potter* movie.



The Result



The scene is almost complete. Just one thing missing...



...and here it is. As the helicopter falters, the extras run for cover.



Moments later, the CG Black Hawk ploughs into the ground, dramatically skidding straight towards the camera.



The CG model is accompanied by ground displacement maps, and both CG and live dust effects, to create a believable crash.



For a final flourish, one of the shattered blades elements rip: CG chair apart. More live deb is added to enhance the effect



In at the deep end

Pop on your goggles and snorkel, boot up the coverdisc version of *PIXELS3D* 3.7 and prepare to tackle a 3D denizen of the deep – the giant squid **BY GEORGE CAIRNS**

All the images for this tutorial can be found on the cover CD



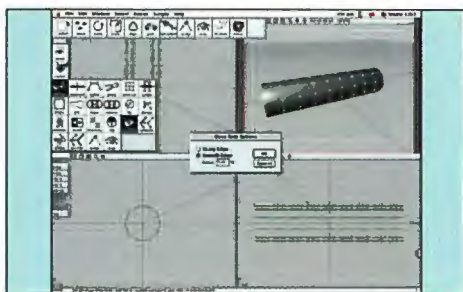
Way back in the debut issue of *3D World*, we used *PIXELS3D* 3.7 to create a spooky graveyard tutorial. Since then, we've used it as a testbed for many generic Q&A queries – and now the lucky Mac users among you can discover how versatile it really is, because the full application is available on this month's cover disc.

Before you dig into the tutorial proper, though, practise navigating around the interface using the move, rotate and pan icons above the windows; the easy-to-follow keyboard shortcuts (shown throughout this tutorial in brackets) are equally effective. To zoom in and out, click-drag with **Alt + left mouse button (lmb)** held down; to pan, press **Shift + lmb** to pan; to rotate the camera view, press **Control + lmb**. Once you're accustomed to the controls, go to **Scripts > New Project** to create the folders you'll need later.

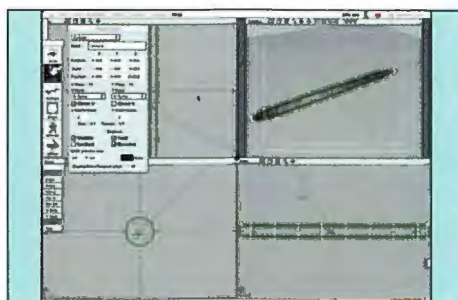
George Cairns teaches students the joys of *Maya* by day, by night. His alter-ego produces sci-fi artwork for CGCs.



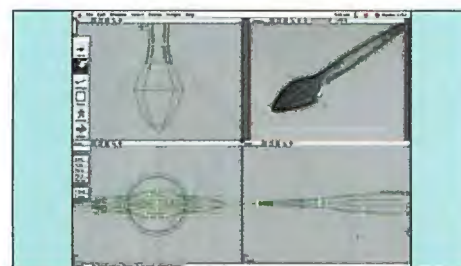
STEP ONE terrific tentacles All it takes is a cylinder...



1 Go to the Shapes Palette and create a default cylinder with a length of 80. From the Reshape Palette, close the ends of the cylinder using the Close Ends Tool. Set the Close Ends options to Smooth at 60 per cent. In the Object Info box (Command + I) label the cylinder "Tentacle."



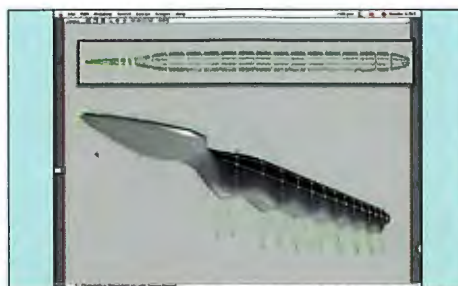
2 Scale the cylinder along the z-axis by typing in 4.0 in the Object Info Palette. Alternatively, choose the Scale Tool (e) and constrain the z-axis (c) in the Constrain Palette. Select the Cylinder (Command + Click), then click-drag with the lmb to scale the cylinder until it's longer.



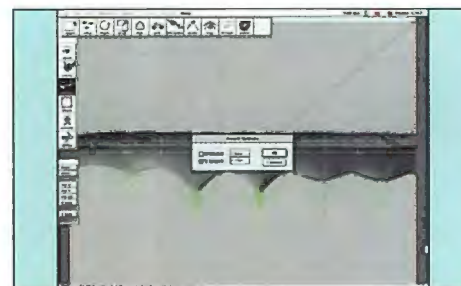
3 Set the toolbar to Tag (v). This selects the Control Vertices (CVs) rather than the object as a whole. Now select the CVs near the tip of the tentacle, constrain the y-axis (c), and using the Scale Tool (e) click-and-drag to flatten the tagged CVs. Now select and scale the second column of CVs along the x-axis (z) to widen the flattened tentacle's tip.



4 Set the Constrain Tool to V Col (Shift + x). Select a V column on the tentacle. Click on Reshape > Insert. Insert an extra V Columns with a value of 0.5. Notice that an extra column appears on the tentacle. Now work your way down the cylinder inserting extra V Columns.

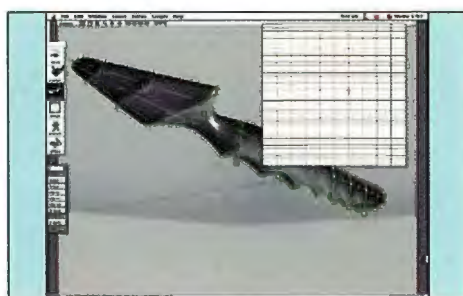


5 Select the Point (Shift + z) and Tag (v) constraints. Constrain the y-axis (x). In the right view, Shift + select alternating vertices along the lower part of the cylinder. Use Control > Move (or press q) to move the CVs down in the y-axis. They will form the tentacle's suckers.

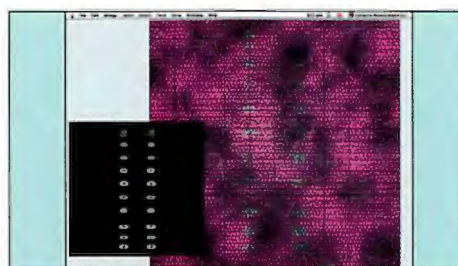


6 Note that the suckers are still too spiky. Insert more V Columns into the areas where the suckers need more definition. Use small insert values like 0.1, and -0.1 for this. Add some extra V Columns and suckers to the flattened tip, and scale out the back of the tentacle to make it wider.

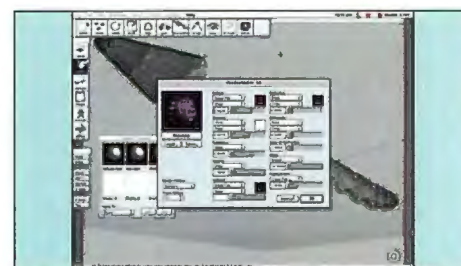
STEP TWO texture time Time for Pixel 3D's powerful Shader Manager



1 Hold Shift + Command to select the vertices that make the tips of the suckers. Choose File > Export > Tag Map. This creates a flattened image of the tentacle's UV coordinates with the tagged vertices showing up as red dots.



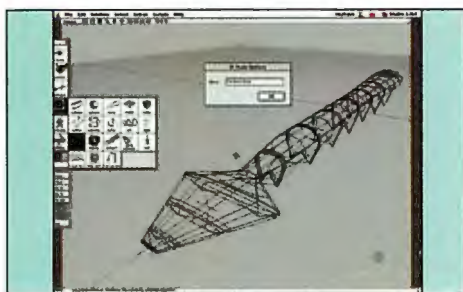
2 In Photoshop, use the tag Map's red dots as a guide to paint suckers that will map back onto the tentacle in the right places. Paint white circles on black to put into the tentacle Shader's bump, displace and ambient channels. Save the textures in the Pixel Project's Img (Images) Folder.



3 Select the tentacle and press Command + W to open the Shader Manager. Click on New Shader, then the Diffuse channel and select Image Map. Import your User-Defined Colour Map (CD-Texture.pct) and put the black-and-white map (CD-tentump.pct) into the bump and ambient channels.



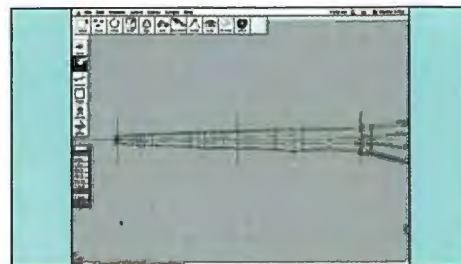
STEP THREE them bones IK joints to make your monster pose



1 In the right view, choose IK Chain from the Shape Palette. Click to place a root and seven joints from the cylinder's shoulder to the tip. Place the joints so that the tentacle will bend between each of the sucker pairs. Press Escape to finish the chain.



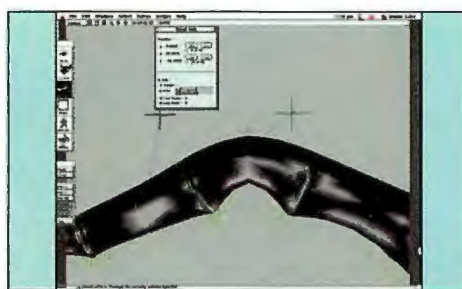
2 Select the cylinder, then Shift-select the root_joint at the shoulder. From the toolbar at the top, press link/unlink. Park the geometry when prompted. This resets any rotation or scale values used to create the tentacle. The tentacle is now bound to the root_joint.



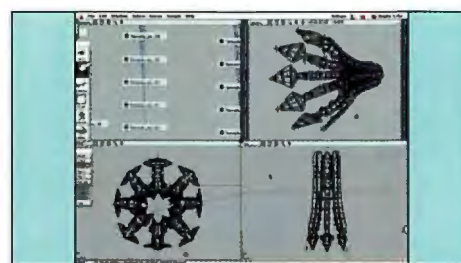
3 Specify what CVs link to what joints. With the Tag constraint turned on, select the CVs from the tip leading up to joint_6. Change Top view to the Schematic view. Hold Shift + Command and add tentacle_joint 6 to the selection. Press link/unlink. Turn off Tag and test the newly-bound skin by moving jnt_7.



4 Work your way down the tentacle, linking selected CVs to appropriate joints. Use the Schematic view to add the relevant joint to your selected CVs, and test the binding of skin and bone as you go by moving various joints. The tip joint should let you drag the tentacle around.

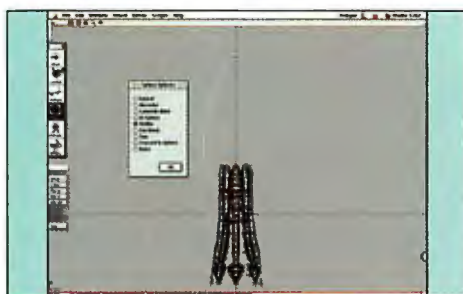


5 Go to Window > Point Info to select V Columns which look too sharp when the tentacle bends. Move along the V Columns by clicking the arrow in the Points Info Box. Here you can give the V Columns a lower IK weight to make them bend more smoothly.

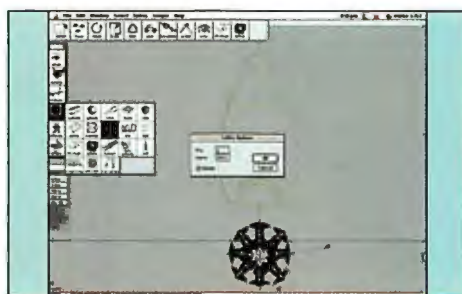


6 Select the tentacle's root joint. Go to Edit > Duplicate Hierarchy. Select the new Tentacle chain and joints (but not the cylinder) using the Schematic view. Move them down in the y-axis. In the Object Info box, select the new tentacle's geometry. Rotate it 180 degrees about the z-axis. Repeat this process until you have eight tentacles in appropriate positions.

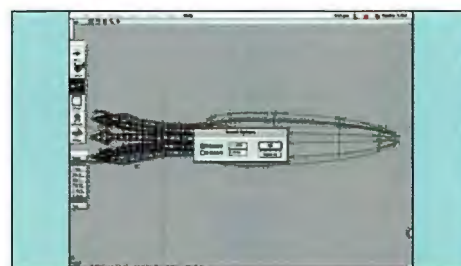
STEP FOUR body builder Give your cephalopod a body to die for



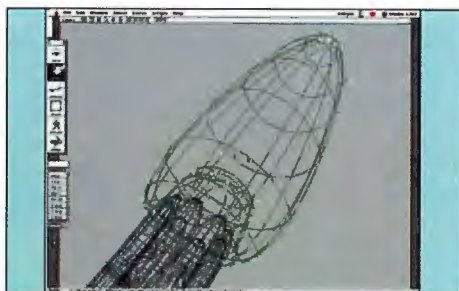
1 In the Top View, select the Spline Tool from the Shape Menu and click to draw a NURBS spline profile of half the squid's body. Hit Escape when the curve is completed. Use the Object Manager to rotate the spline 90 degrees in the x-axis.



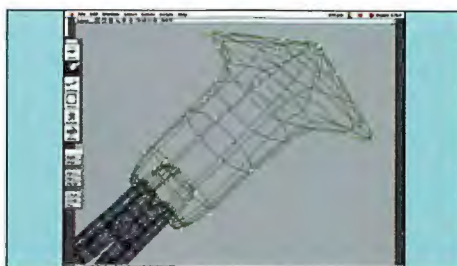
2 From the Shape Menu, use the Lathe Tool to lathe the spline 360 degrees with eight stages. Then rotate the lathed object -90 degrees in the x-axis to align the head with the rest of the tentacles.



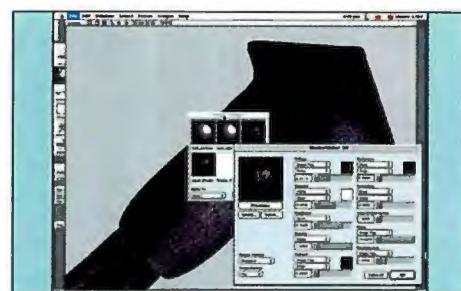
3 Set the Constraint Box to U Col and select the column running along the side of the body. Use the Insert tool to add more U columns along the length of the body. Make the first setting at 0.2 and the next at 0.5. Do the same with the Column on the opposite side of the squid.



4 Shift-select some tagged CVs on both sides of the body's rear. Scale these points out in the x-axis to create two fin-like extrusions at the top of the squid's body.

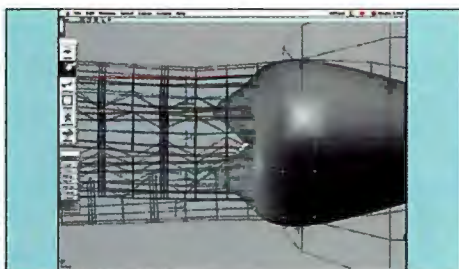


5 Insert more V Cols to smooth out the shape of the head, but be prudent with your inserts to save processing and rendering time. We could subdivide the shape, but let's see if it'll render okay as it stands. This will save you time in the long run.

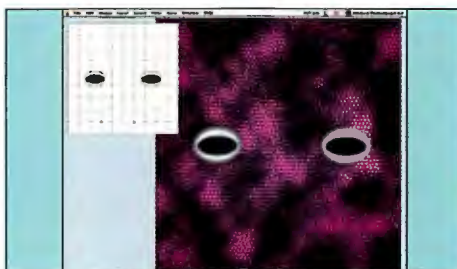


6 Create a new Shader for the body by adapting the original Tentacle Shader you created earlier. This version won't need the tentacle's bump or ambient maps.

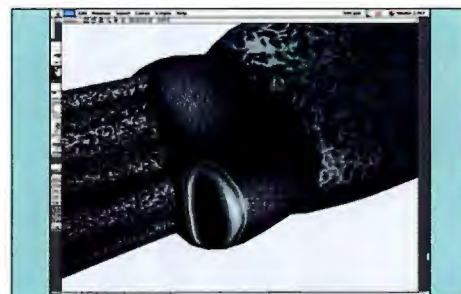
STEP FIVE heads up! Time to give our pelagian pal some peepers



1 Create a Sphere. Scale and position it between the tentacles and the body. Select tagged CVs at the front of the sphere and drag them inside the sphere to create a mouth. Select adjacent CVs and move them along the z-axis to create a more beak-like shape.

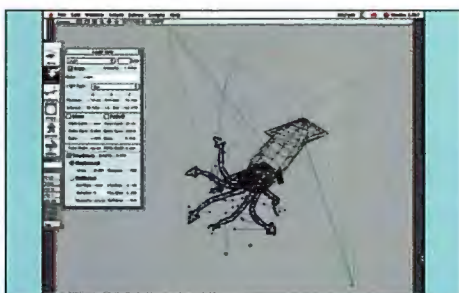


2 Select two tagged points where the eyes should be and export a Tag Map. In *Photoshop*, use the original squid texture and add the new Tag Map as a separate layer. Paint in a couple of aquatic looking eyeballs that line up with the red tagged points.

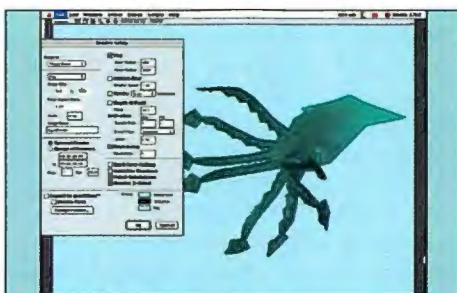


3 Now create a new Shader and import the head Image Map (CD – headtexture.pct) into the Diffuse section. Do a test render (Command + R) to see if the eyes align okay with the rest of the squid's physiognomy.

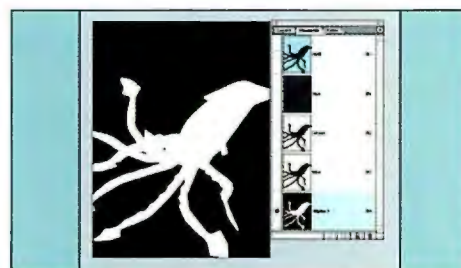
STEP SIX final render Release your squid into a digital ocean



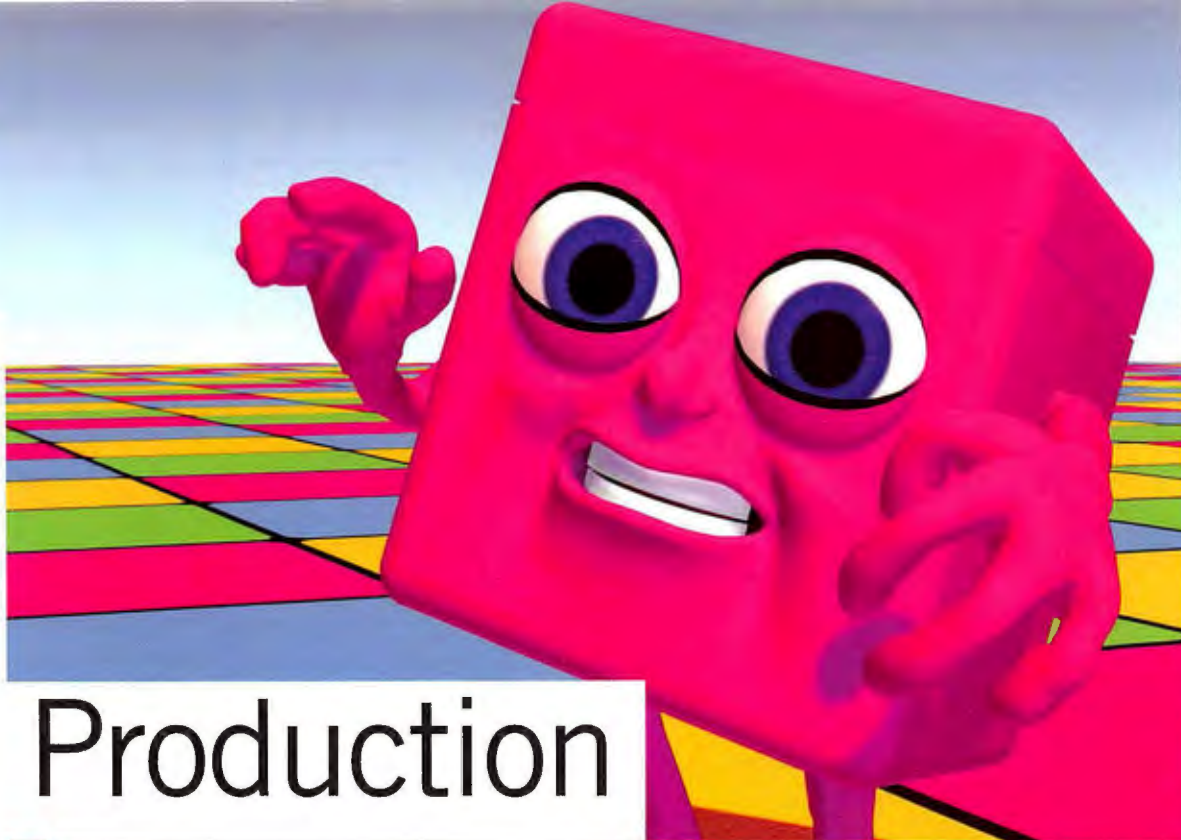
1 You're ready to bathe your squid in aqueous light. Go to the Shape Palette and click on Light. In the Object Info box, make the light a Spot and focus it on the squid from above to simulate distant sunlight. Make it cast ray-traced shadows. Add a green tinted spotlight underneath the model as a fill light.



2 Press Command + U to open the Render Setup window. Click on Fog and change the colour to an aquatic bluey-green. Experiment with changing the inner and outer fog radius and doing a test render (Command + R). When you're happy, do a Final Render (Command + F).



3 The final render contains an Alpha channel that enables you to composite the squid with other elements in *Photoshop*. Render up differently posed versions of the squid to go in the background of your final composite. The rocks you can see in the final render are actually pictures of a cliff that have been rotated 90 degrees clockwise (CD – RockBG.psd).



Production

As the production sputters into life, the pressure's on to deliver your project on time. In part three of our six-part tutorial, we show you how to whip those vital words, voices and pictures into shape

BY DAVE OSBORNE

Eefore one line of dialogue is recorded, it's vital at this stage to hone your script, direct your voice artists and storyboard effectively. An exciting time, of course, but now the pressure's on to see the project through to completion. Commitments have been made, and once the first episodes start in animation you're entering the heaviest part of production, financially speaking.

THE FINAL DRAFT

The final draft or "polish" is the last phase of the scriptwriting process. The scripts now takes into consideration all the comments made by the commissioning editors and executive producers, and any details are fine-tuned. The final step is to number the dialogue to help the communication between yourself as director and the voice artists during the recording session. It's far quicker to read out a number if you require a retake than to read the line back to the artist, and it also makes the job of identifying lines simpler for the sound engineer.

In recent years, the process of scriptwriting has been aided by the development of specific word processing packages such as *Final Draft*. These simplify the writing process by providing the script format template and offering other tools, such as a character name database. Of course, software like this doesn't necessarily make a great script – that's still down to the writer – but it does shift the focus away from the arduous formatting.

And without a great script, you won't create a great show, no matter how technically perfect your animation is. It's far better to be ruthless with the words at this stage, because changes later on are far more expensive to implement. Weak scripts can also be a result of poorly developed concepts and perhaps a TV series without a clear premise. As Sarah Greene, the producer of *The Cubeez*, makes clear: "If you haven't got the basic ingredients

then you may as well start again." If you *are* having problems, examine your original series bible to ensure that it's clear and still working after all the various stages of development.

Once you've got a handful of great "polished" scripts, however, you're in shape to proceed to the next stage.

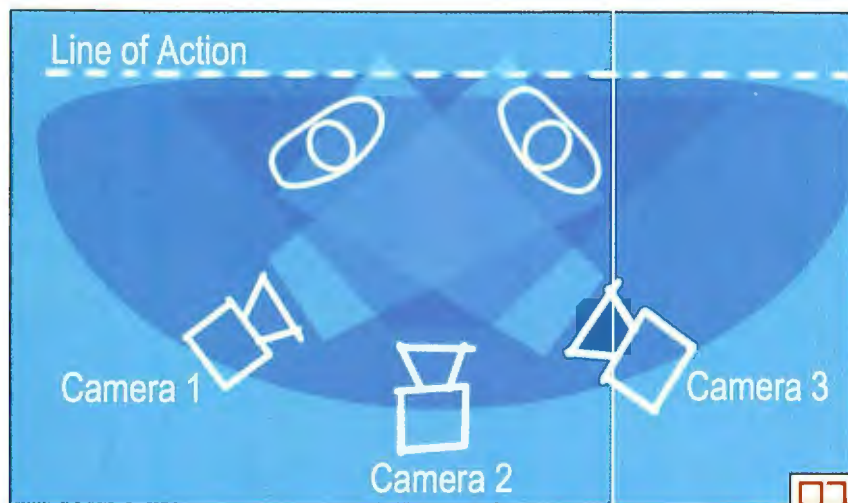
VOICE RECORDINGS

There is a difference between directing animators and actors. Animators often appreciate directors who are exact with their direction to the last frame: "Start to make him angry at frame 70, then have him walk off at frame 110..." This kind of approach won't mean much to an actor. Also fatal is "parroting," where you give your own reading of a line for the actor to copy; they'll simply struggle trying to repeat your delivery and for the rest of the session won't feel confident with their own ideas.

With *The Cubeez*, we started out showing the actors the designs for their characters. This enabled them to get a physical appreciation of what they were trying to play. And if it isn't in the script, try to add detail to the atmosphere. Is it hot? Are the characters thirsty? Look for ways to help the actor visualise and ultimately act out the dialogue. I always ensure that actors have enough information in the script itself. I'd go through it beforehand and see that it was clear where the action had a direct result on the way the dialogue should be delivered.

Before the recording session, the scripts are sent to the voice artists so they can read their parts. At the recording session itself, I'd advise going for a take without rehearsal. You can get around 60 per cent of the way on the first take, especially if you have all the artists working together at the same recording session. You'll get many things you didn't expect, and the pickups are easily handled using the numbered line system. We always recorded *The Cubeez* as a group, so the actors could react to each other –

[CUB] *The Cubeez* is a 3D CGI series aimed at pre-school kids. It's currently on GMTV in the UK and has been sold around the world. See www.cubeez.com for more information.



you get a livelier performance when working as an ensemble. At the end of a recording session, it's also worth laying down plenty of "wild" coughs, hellos and laughs sounds that will not initially be part of the sync track but will be used to fill gaps or add to group scenes for audio depth. Make a list of your requirements and ensure they're logged properly on the day, because this will save time for the sound editor who'll need to formulate a wild voice library of these sounds for the track-laying process.

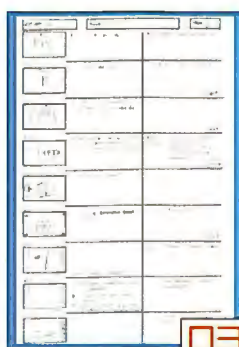
STORYBOARDS

When many young storyboard artists start out, they often focus on the detail in the frame rather than its relationship to the audience. They look at it as a comic book illustration, where the reader can re-scan a page if he misses something rather than a moment in a film where the viewer only gets one chance to experience the scene. The audience wants to understand what is going on in the story and you determine that by, as a rule, what is shown and said. The audience are either in front of the story – knowing what is going to happen by the fact it has already been revealed to them – or they are behind the story and it's being revealed to them. Understanding this enables you to determine what's in frame and what's being heard. This has to be supported with a knowledge of editing, continuity and staging.

As a director, you'll want to determine many of these issues. On *The Cubeez*, I produced a thumbnail storyboard derived directly from the script and this gave an indication of the breakdown of the shots for the storyboard artist, who then created a fully detailed board. "Directors vary in how much action detail they require," adds Jan Page, scriptwriter on *The Cubeez*. "Personally, I like to find some middle ground, adding camera directions only when it's crucial to the action."

What's important is flexibility. A director wants to be able to expand or edit sequences, and if the writer has spent a lot of time penning all the camera moves, altering one element could well render useless all that work. It's therefore better to determine the shots yourself, because you should be the one with the clearest idea of how it's all going to work.

When planning dialogue sequences for *The Cubeez*, I took advantage of the three-camera set-up typical of much live-action



[01] While storyboarding, remember the golden rule about the 'line of action' – and be visually economic with your sketches [02-03]. They don't have to be great works of art; they just have to communicate your ideas effectively.



TV. This also highlights one golden rule: don't cross the line (see illustration [01]). The idea behind this is that it stops the viewer being confused by keeping the screen direction consistent. If you cross the line, it can be disorientating. Of course, rules are there to be broken, but you must understand what you're doing in order not to throw viewers.

Having got the storyboard working, it's worth remembering how it's viewed. It's common practice for productions using overseas subcontractors to use a three-panel board to allow plenty of space for the translations. I think there's a big disadvantage to this because it doesn't enable the artists to see the scenes as extended sequences. This ultimately results in continuity errors and scenes that feel isolated in terms of pace. I prefer having at least six panels on a storyboard page. This gives an extended view of a sequence, and ensures that scenes aren't viewed in isolation for any part of the production process. In my experience, this helps to reduce continuity errors and enables animators and those who do the scene set-ups to see the shots in context. The level of detail placed in the storyboard is usually determined by the amount of time available during storyboarding. Backgrounds, for example, aren't as critical in every panel, but are obviously worth indicating in wide shots and a master shot to help indicate the scene's geography. Close-up dialogue shots, however, don't need any indication unless there's a specific reason for it, such as a character going through a doorway. Lastly, remember the storyboards will be copied dozens of times, so work in dark pencil which photocopies well.



Dave Osborne is a freelance animation director who entered the industry as an animator on the 2D TV series *The Tubemice* in 1987. Since then he has worked in a number of animation studios. While at Telemagination he directed a TV series called *Wiggly Park*, which was followed by pilots, pop promos and commercials. He also directed episodes of *Noah's Island* and *Captain Pugwash*. *The Cubeez* was his first directing experience of 3D CGI. Since then he has made several pilots and a commercial in 3D, and is now developing some of his own ideas for television.

RIGHT Practice makes perfect. "I once modelled an eyeball just to practise, but before I knew it, I'd modelled the tentacle supporting it. I have some ideas for a story in which this guy encounters different characters and travels between imaginary worlds, but that's still a work in progress..."

MIDDLE, RIGHT More adventures of the eyeball. This was originally created in *3ds max*. "I liked its shape, so I rebuilt it in *Maya* by lofting curves."

BELOW While at Canvas Multi-Media, Martijn also worked on an animated short about a sheep that's afraid to lose its wool.



STARTING OUT

Martijn Grootendorst

"I know how to rotoscope a cat's head pretty well..."

Stacking up on experience, multimedia graduate

Martijn is now turning industry heads, too

BY VICKI PEARSON

Martijn Grootendorst first came face-to-face with 3D design and animation while studying architecture at university in Rotterdam. It was an encounter that changed his life. During the four-year course, the Dutch student familiarised himself with *3D Studio R4*, an early version of *max*, by detailing, modelling and animating imaginary buildings. "After that, I kept working with *3D Studio*, bought some books and spent almost every night learning 3D," confesses Martijn. "For every project, I kept on using 3D to visualise my concepts and designs until I felt I definitely wanted to do more with 3D than architecture alone."

Which prompted him to enrol on another course, Multimedia, at the art college in Rotterdam, where he spent a further three years improving his skills. "3D has an infinite number of challenging aspects," enthuses Martijn. "You can be sculptor, painter, cameraman, director, writer – all at the same time." He's already developing his own ideas of the industry and the aspects of 3D with which he wants to work. "I think it's cool how realistic objects can be visualised nowadays, but I'd rather make surreal subjects look convincingly real than duplicate my toaster."

During the course, aside from spending time on personal projects, Martijn also motivated himself to find work experience





"I'D RATHER MAKE SURREAL SUBJECTS LOOK CONVINCINGLY REAL THAN DUPLICATE MY TOASTER"

LEFT These CD covers for an animated children's series on CD-ROM were made during Martijn's internship at Canvas.

TOP RIGHT The landscapes in Martijn's personal work, the eyeball series, feature some interesting types of tree, created using *3ds max*.

with prominent Dutch multimedia outfits working on both films and animations. An internship at Canvas Multi-Media in The Netherlands saw him working on a series of CD-ROM titles for children using and gaining experience in 3D package *Maya*. Martijn's contribution to the 3D aspects of the projects involved modelling, texturing, lighting, rigging and animating the numerous characters, which were then composited onto hand-painted backgrounds by the author. It was an enjoyable experience, especially when developing interactive objects for the games. "I was given the green light for inventing and adding a little humour to these. It's very satisfactory when you've finished a funny and tangible product and kids like to play with your product."

After graduating, Martijn spent two months at film production company Lukkien Digital Studios working on a feature for Dutch cinema. "Being part of a team working on the film *Minoes* has been a great and instructive experience, and seeing your name on a big movie screen is, of course, very cool."

The rather unusual but popular film (it has already attracted over half a million Dutch viewers) focuses on a cat who turns into a human and is befriended by a local reporter. It contains six minutes of digital effects footage featuring talking cats, not

unlike movies such as *Stuart Little* and *Cats And Dogs*. Martijn's role was rotoscoping, and later, rendering and animating.

"We had eight cats with virtual masks, complete with inner mouth and whiskers, all modelled in *3ds max 3.1*," he recalls. These were matched frame-by-frame with the live footage, while the animators worked on the lip-sync before the rotoscoped files were merged into the scene. "The live footage was actually deformed with an animated camera map that was projected on the masks. The compositors used these images and renders of the interiors of the mouth to create the final effects shots of Dutch-speaking cats. No Hollywood cat ever did that before... After *Minoes*, I know how to rotoscope a cat's head pretty well."

This experience has given Martijn a new outlook on the industry, enabling him to appreciate both working solo and as part of a team. "I'm inspired working with other talented and motivated people," he says. "The feedback you get from your colleagues can be very helpful and motivating. But it's important to fool around a bit and have some good laughs once in a while."

Fresh from graduation, Martijn is now on the look-out for more work in the field, but with his stack of enthusiasm and experience, he won't be waiting long; he's already looking to the future. "I wonder how things will be in five years' time," he muses. "Will audiences be bored with 3D after seeing *Final Fantasy 9*? I'd love to see fully animated movies in different genres, like thrillers and cult movies. As for the art, I think museums should consider investing in projectors for 3D artists that will demand a place to exhibit..."

FACTFILE

GRADUATED 2001
Grafisch Lyceum,
Rotterdam, Netherlands

CREDITS Lukkien Digital
Studios, *Minoes*

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web.kids.planet.nl/minoes

CONTACT m.grootendorst@wanadoo.nl

CREDITS
Lukkien Digital Studios,
Minoes, Canvas Multi-Media



discover Terragen

Well-crafted atmospherics are the key to enhancing 3D landscapes. Enter, stage right, planetside's superlative *Terragen* **BY FRASER SMITH**

All the images for this tutorial
can be found on the cover CD



Terragen is renowned among 3D enthusiasts for the realism of its renders. Even a novice can produce photorealistic landscapes with the minimum of effort. Much of this, of course, is down to the quality of *Terragen's* atmospheric model – so why is it that neophytes tend to leave this aspect of the program until last? After all, good atmospherics can totally transform a landscape – as the background shot on this page demonstrates.

With this tutorial, we intend to show that working with *Terragen's* atmospherics needn't be as daunting as it first seems, and that the atmosphere can often be the most important element for setting the overall mood of a render.

We'll also make a brief foray into the world of *MojoWorld* which, with the recent addition of terrain exports, has become an excellent source of heightfields.

A free version of *Terragen* for non-commercial use is available from www.planetside.co.uk. The SOPack plugin is available free from www.geocities.com/ffrog_geo/sopack.html. *MojoWorld Generator 1.1* is available from www.pandromeda.com.

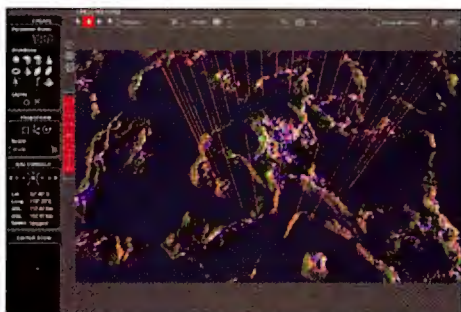
For more examples of Fraser Smith's work, feel free to visit his galleries at www.terrography.com. For more *Terragen* links, visit www.terrasource.net or join the usergroup at groups.yahoo.com/group/terrigen



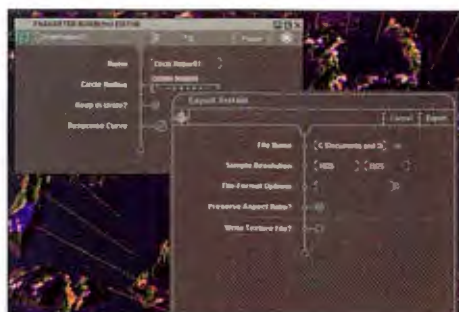
Fraser Smith was inspired to explore this field of 3D art after seeing Richard Voss's images in *The Fractal Geometry of Nature*. Visit www.terrography.com for further examples of his work.

step one sculpting your terrain

Find an interesting feature in *MojoWorld*, then export it to *Terragen* to prepare the scene



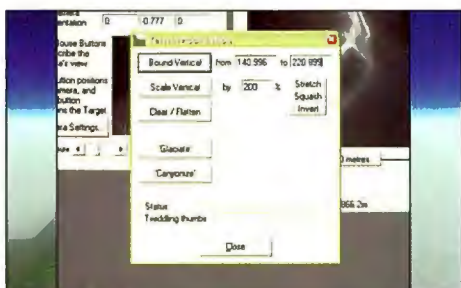
1 In *MojoWorld*, choose an area that you think will make an interesting scene and create a Helper or Parameter Bomb. If the camera is pointing Northwards and the Helper is created by dragging the mouse to the left then the resulting terrain will be correctly aligned to North.



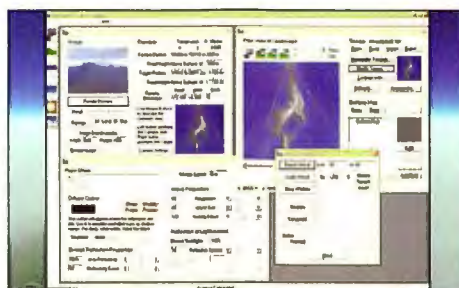
2 Open the Helper dialog. You can fine-tune the radius here. Pull down the menu and select Export Terrain. Choose a filename and set the resolution to one of the standard sizes supported by *Terragen* (other values will give unpredictable results). Click Export to produce the *Terragen* file.



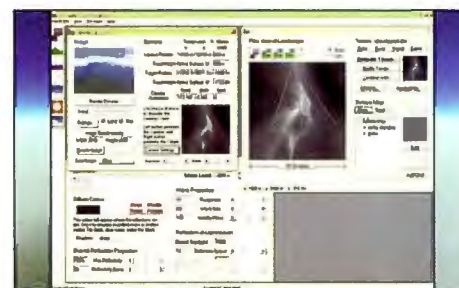
3 Open *Terragen* and load the terrain file exported from *MojoWorld*. (The TER file shown above and the one shown in the previous steps are included on the cover CD, as are all the world files and images used in this tutorial.)



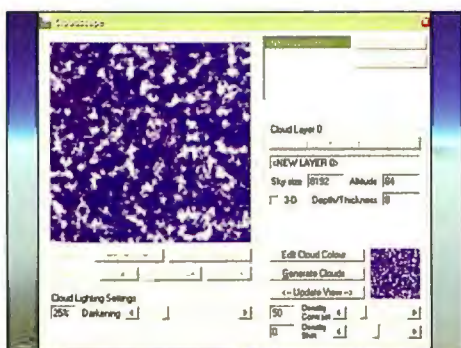
4 Many atmospheric settings are relative to zero altitude, so it's important to adjust the height range of the terrain so that the lowest point is at zero altitude. For this example, we use Modify Terrain, Bound Vertical and set the values to 0 and 80.



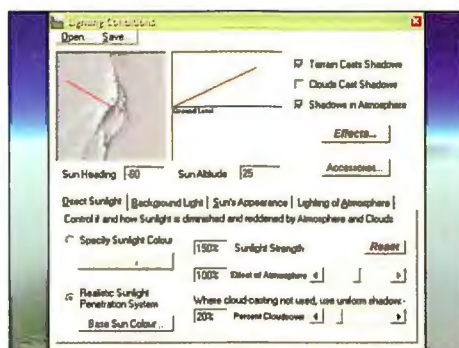
5 If the planned scene contains water, it's a good idea to set the water level to zero and use Modify Terrain, Bound Vertical to raise or lower the terrain to suit. This ensures that the atmospheric settings always start at sea level.



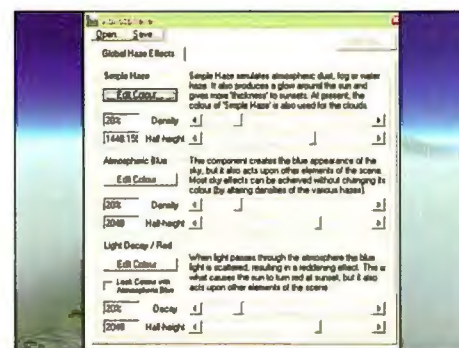
6 Position your camera and target – and create or load a surface map. For this example I've used a fairly simple grassy surface. Render a preview. You can speed this up by sliding the Detail slider a couple of notches to the left.



7 Use the Cloudscape dialog to create and modify the cloud layer. You'll often have to increase Skysize to eliminate black areas on the horizon. Setting the sky altitude lower than the highest point on the terrain, however, can cause unwanted lighting effects, so be careful.



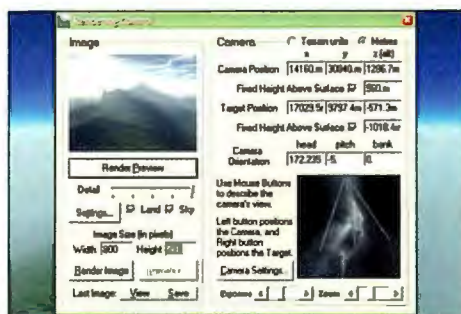
8 The Lighting Conditions dialog covers all aspects of sunlight and shadows. For best results, switch on all three shadow checkboxes, use Realistic Sunlight Penetration and Multi-directional Shadow Lighting (on the Background Light tab). Sunlight strength is also a useful setting, as you'll see later.



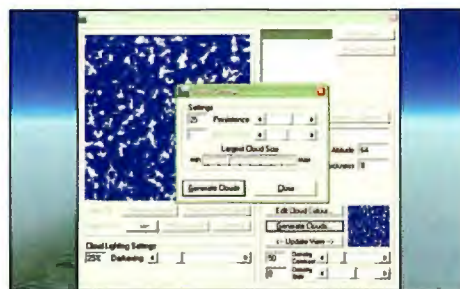
9 The Atmosphere dialog controls Haze, the blueness of the sky and of distant features, and the scattering of light as the sun approaches the horizon. The three Half Height sliders control the fall-off of these effects and refer to the altitude (above zero) at which the density is reduced by half.

STEP TWO creating the image

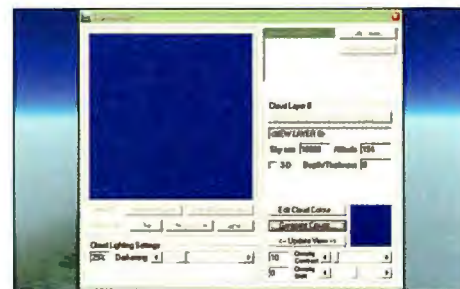
Discover how the application of atmospheric effects can transform your world for the better



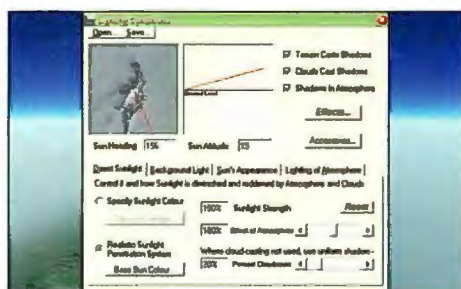
1 Creating the image on page 60 requires some careful manipulation of atmospheric effects – we need to tweak the cloudscape and haze to emulate the effect of the sun's rays cutting through the atmosphere, and then up the Shadow lightness to increase the contrast.



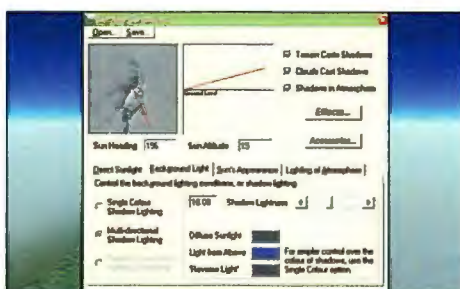
2 The default clouds are too large for the desired effect so let's create new ones. Open the Cloudscape dialog and click on Generate Clouds. Reduce the Largest Cloud Size slider by a few notches and click Generate Clouds. Leave Persistence at its default value. Higher values of Persistence result in more detailed clouds; lower values, smoother clouds.



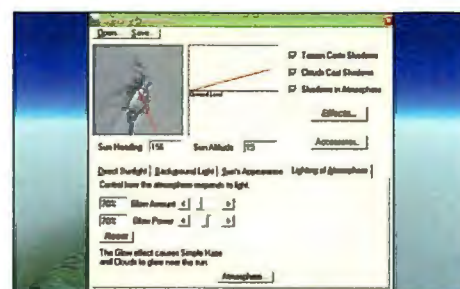
3 The default clouds are still too dense, so we'll reduce Density Contrast to ten and Update View to refresh the preview. While in this dialog, we'll also increase the sky size to its maximum of 10,000 and raise its altitude. If cloud shadows aren't falling quite right, raising and lowering the sky is a useful technique for moving them in small increments.



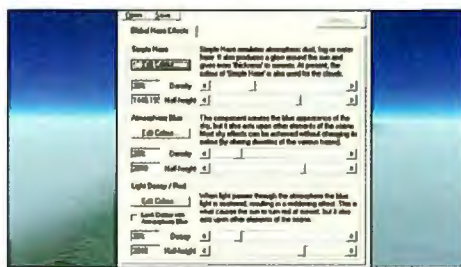
4 Set the Sun azimuth and altitude so that it appears within the field of view of the camera. Select all three shadowing checkboxes to ensure that everything casts shadows, and choose Realistic Sunlight Penetration. We'll leave the base sun colour at white and the sliders at their default values.



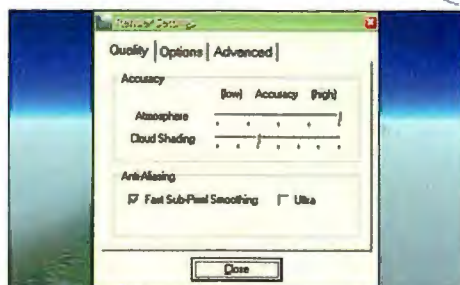
5 Set the Multi-directional Shadow Lighting radio button to enable a more accurate shading model, but leave the three shadow colours at their default values. To accentuate the shadows in the atmosphere, reduce the Shadow Lightness slider from its default to 16. Low values can give dramatic rays.



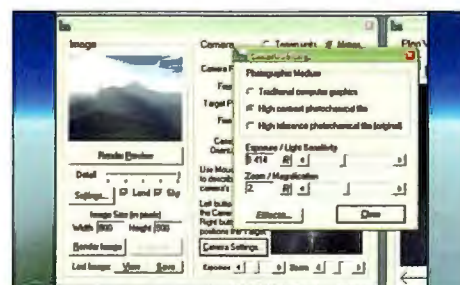
6 We'll skip the Sun's Appearance tab and move straight on to the Lighting of Atmosphere tab. These two sliders control the amount of glare generated by clouds and haze. In this image we're looking straight into the sun so the glare could be excessive. Reduce both sliders to 70 per cent.



7 We're going to do little with the Atmosphere dialog other than to thicken the haze to 30 per cent. The Density and Half Height controls can be difficult. A low half height and a low density produces a thin layer of haze just above zero altitude. To increase the thickness of this layer, you need to increase the density of the haze so that the fall-off to zero takes more altitude. Experiment with this to see how you get along.



8 For a final atmosphere render, it's generally appropriate to opt for the highest accuracy, but not always. Often a dramatic shadowing effect appears when working at low accuracy and then completely disappears in the final, more accurate render. Cloud Shading accuracy is only of use with 3D clouds, so we'll reduce it here to limit render time.



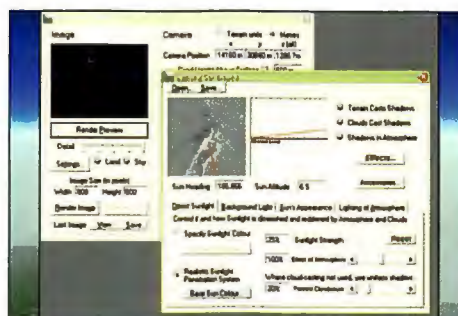
9 The Exposure and Zoom sliders on this dialog duplicate the two on the Rendering Control dialog. It's best to leave Exposure at its default value here and install the free SOPack plugin which enables *Terragen* to create high dynamic range (HDR) images which you can then view or modify in HDRShop or HDRView.

step three light variations

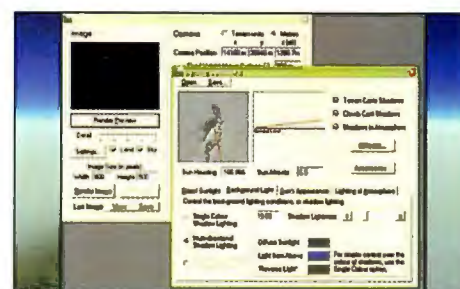
Terragen has everything you need to create that tricky night scene



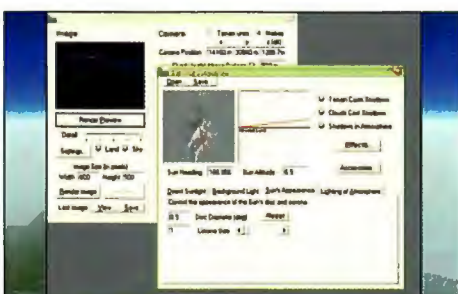
1 Terragen doesn't do moons and planets so creating a night scene has to be a compromise. You have to adjust the sun so that it looks like a full moon and of course reduce the lighting significantly. But there are other techniques you can use to simulate the effects of nocturnal gloom...



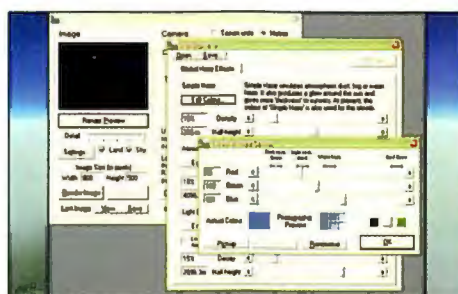
2 The albedo of a full moon is 0.07 or 7 per cent of the sun's light. We'll settle for 25 per cent here, but reduce the Base Sun Colour to a mid-grey. Remember to adjust the position of the 'Moon' so that it peers through a gap in the clouds.



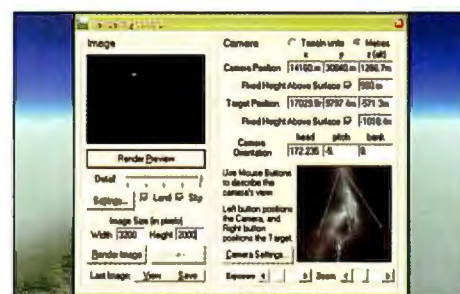
3 To add to the overall darkening of the scene, reduce the Shadow Lightness to 9 or less. We haven't adjusted the three shadow colours here – Diffuse Sunlight, Light from Above and Reverse Light – but they're yet another avenue to explore. In this scene, however, they aren't required.



4 We didn't use this tab in the last example. This time, though, reduce the Sun's size to 0.5 and its corona to 1 to create a sharply defined disk. Note, our 25 per cent Sun strength will have been reduced by this. Now if we include our reduction in Sun colour by about 30 per cent then we're probably getting close to the true 0.07 albedo of the Moon.



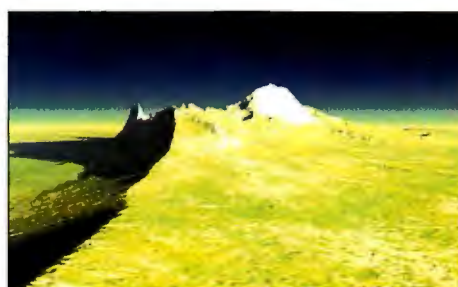
5 To even out the colouring, reduce the atmospheric blue to 10 per cent and increase its half height to 4,096. This has the effect of darkening the blue and spreading it more evenly across the sky. Set the haze and light decay as above (15 per cent/256m, 15 per cent/2896.3m). Edit all three colours, setting them to blue shade. This helps spread a blue cast over the scene.



6 When rendering any scene where it's desirable to have the disk of the sun sharply defined (i.e. with little or no corona), it's always wise to render at the highest resolution possible. Irregularities in the sky rendering can give the sun disk a ragged edge when rendered at lower resolutions. Put the sun too near the horizon and distortion can occur.



7 A low, dense haze, allied with an even lower but very bright (1,500 per cent) sun directly behind the camera and brown shadow colours, results in a hot, dusty scene like this. The extreme brightness of the sun is heavily attenuated by its low altitude and the thick haze. Note how bright the peak is where it rises above the haze.



8 This image demonstrates what happens when you reduce the atmospheric effects almost to zero. Atmospheric Blue is set to 1 per cent to prevent the sky turning completely black. Haze is at zero per cent and the sun is still bright at 1,500 per cent. The harshness of the light shows up the lack of complexity in the surface map.



9 Okay, so we cheated slightly with this image. The sun is at its default strength and the haze is 1 per cent with a half height of 52m. However, we've lowered the whole terrain by 40 units so that the top of the haze layer appears halfway up the hillside. It just goes to show that whatever you do, there's always something new to find with a bit of experimentation.

Q&A

If you have a question for our 3D experts send it to us at 3dw.qanda@futurenet.co.uk
You find more Q&A advice on our Web site at www.3dworldmag.com



How can I render my computer-generated images so I can see them in 3D with red and blue glasses?

WILL SHEPHERD, VIA EMAIL



Although there are other more high-tech methods, using a pair of cardboard glasses with red and blue (or sometimes green) coloured plastic filters still remains the simplest and cheapest way of viewing images in stereoscopic 3D. Actually creating images for use with the glasses is straightforward, too. Indeed, the same tricks are used in TV programmes and movies that require shuttering goggles or polarised glasses.

For the stereoscopic effect to work, you need to create two separate images, one representing what the left eye can see, the

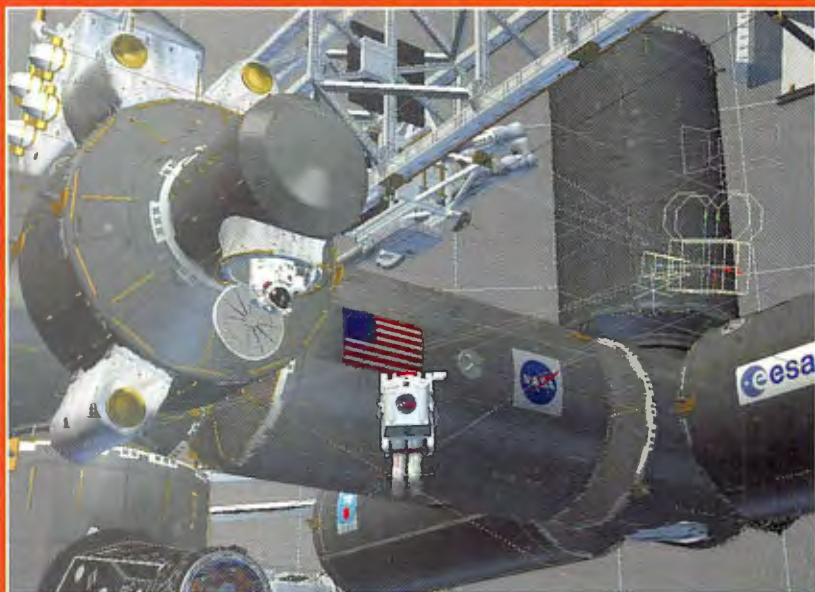
BELOW Note the two cameras being used to render here – the eye separation is slight, but it's still enough to suggest depth when the resultant image is viewed through red/blue glasses.

other what the right eye can see. The glasses make sure that each eye only sees the image intended for it. When you look at a stereoscopic image, you'll see that parts of it appear to be *behind* the screen or piece of paper, while other parts appear to be floating in space *in front* of it. It's the objects in front of the screen that make audiences in 3D cinemas want to reach out and touch them. This is why subjects like the ESA spacestation shown on this page make such good 3D subjects. Once treated, the module in the foreground should literally poke out of the screen!

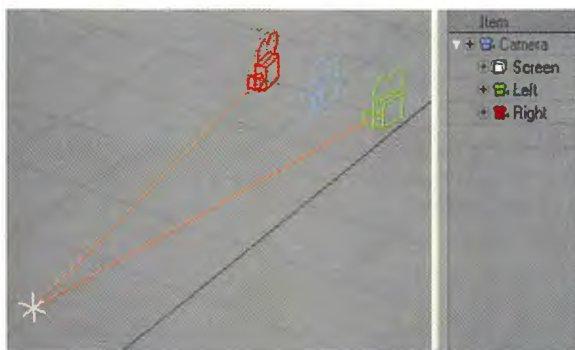
TWO-CAMERA SET-UP

In your 3D animation software, start by composing the scene as normal, positioning the camera and objects to achieve the image you want. Create a null or dummy object, name it "Screen" and parent it to the camera, then move it along the axis of the camera into the scene. This object will define where the screen occurs in 3D space – objects in front of it will poke out of the screen, while objects behind it will disappear into the distance. Where you position the object depends on your scene and the effect you want to have on the viewer, but as a general rule you should have most of the scene behind the screen and only occasionally bring objects in front of it.

Now create two more cameras and name them "Left" and "Right". Parent these to the main camera and move them each 3cm on the x-axis away from the main camera, so there's 6cm between them. Your average human peepers are 6cm apart, so that's a good place to start. However, depending on the scale of your scene, you'll probably find you get a better effect with different values. If you're trying to render a picture of a mountain range, for instance, you might need an eye



FOR THE EFFECT TO WORK, YOU NEED TO CREATE TWO SEPARATE IMAGES, ONE FOR EACH EYE



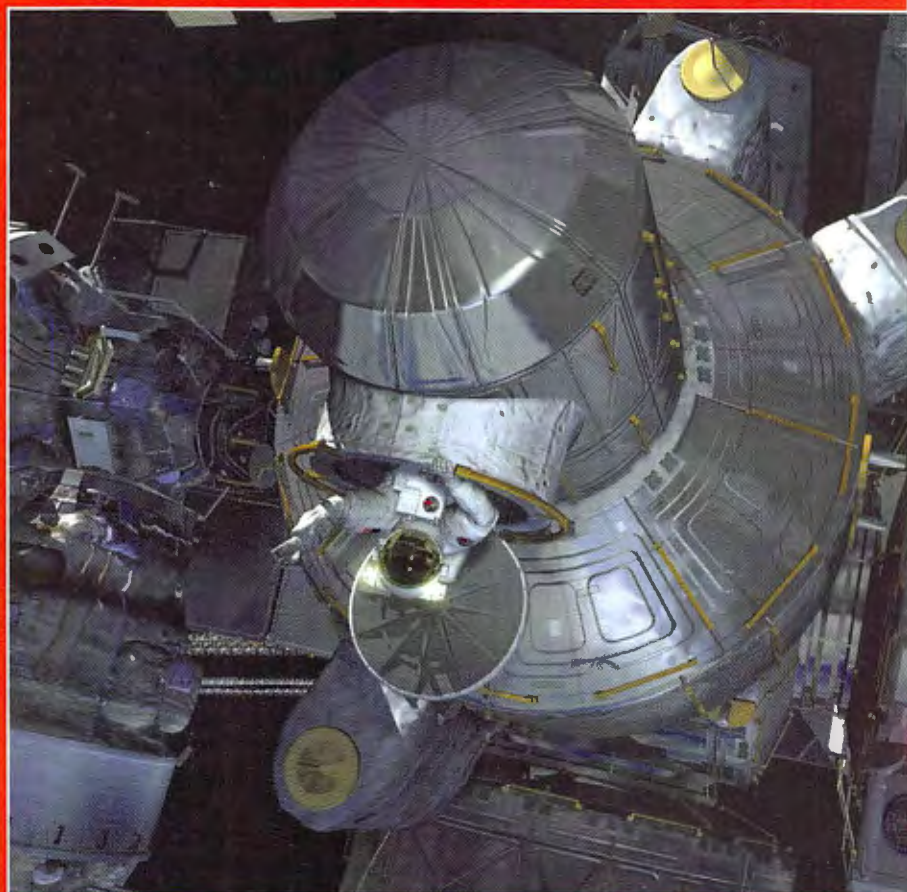
separation of hundreds of metres, whereas an insect requires just a fraction of a millimetre. The best thing is to use an expression or object relation to link the camera separation to a control object, so you can quickly and easily change it.

Target the two cameras to the Screen object so they swivel in slightly – it's this slight rotation which creates the cross-eyed effect that makes objects in front of the Screen leap off the page and objects behind it to recede into the distance.

JEEPERS PEEPERS

If you now render the scene from both the Left and Right cameras, you should have two images that are only very slightly different, because of the small distance between the two camera set-ups. Save them (it helps to use filenames like image_L.tga, because it's easy to get them mixed up) and then load them into *Photoshop*. Make each image greyscale and then convert the Left image back to RGB colour.

At this point, take a look at your 3D glasses and note the colour combination of the lenses: most have a red one on the left and a blue one on the right, so in this instance you want to put the left image into the red colour channel, and the right image into the blue. If your glasses are different, make the appropriate adjustment. Enter the Channels window for the Left image, select the Green Channel, choose Edit > Fill and fill the channel with black. Now copy the contents of the Right image into the Left image's Blue channel and return to RGB



ABOVE This European Space Agency spacestation image is an ideal subject for 3D, because there are several prominent foreground elements.

TOP LEFT A stereoscopic 3D set-up created in *LightWave*. The blue camera is used to compose the image, but only the red and green cameras are rendered.

mode. You should now have a perfect 3D image you can view with your glasses.

If the effect doesn't look too spectacular, try going back into your 3D software and increasing the eye separation. Conversely, if you can't really resolve a 3D image at all, but just see the separate red and blue images (even though you can only see one image when you close one eye) then try using less eye separation. As a rule of thumb, you want just enough eye separation to get a good effect, but no more. On a computer monitor I find no part of the image wants to be more than ten pixels away from its other eye companion, but that will obviously depend on many variables, including the size and resolution of your monitor and how far away from it you sit.

Working with the screen position can be more complicated. When objects come in front of it, it helps if they're floating in space, or else bits of them will seem to be chopped off by the edge of the screen, even though the character appears to be in front of it. This is why 3D movies tend to be full of things that fly, float or flap around the screen. You'll also find, particularly if you create stereoscopic animations, that the subject of interest should ideally be located *on* the Screen, rather than in front or behind it. There is a reason for this – although it might appear to be floating in front of your face, the object isn't really, which can cause eye strain and headaches as the brain tries to focus on something that isn't there.

BY BENJAMIN SMITH



How do I use *Maya* to create a burning fuse that is eaten up by flame, *Mission Impossible* style?

KEITH JARROLD, VIA EMAIL

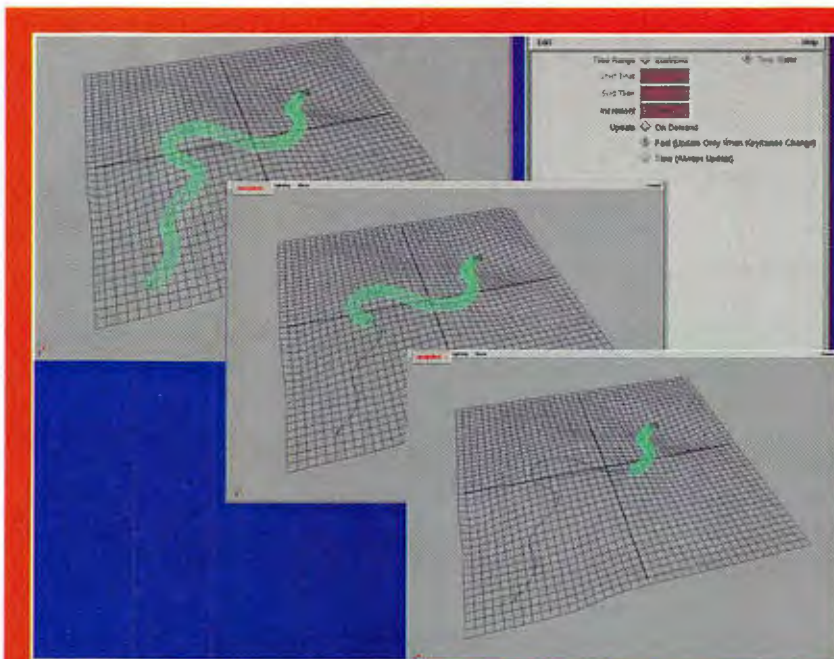


We'll make our fuse sizzle from one end of a NURBS plane to the other. With the plane selected, click on the Make Live icon (the little magnet). The plane should turn green. In modelling mode (F3), select Create > CV Curve Tool. Click to draw the path of the fuse on the plane. Hit Return when the curved path is finished, then click on the Make Live icon again. Now you'll see that the curved path has been drawn along the contours of the NURBS plane surface.

Next step: to create a rope-like fuse that follows this curve. Create a NURBS circle with a radius of 0.5. Select the circle, then Shift-select the curved path. Now select Animate > Motion Paths > Attach to Motion Path Options. Make Front Axis Y and the Up Axis X. Click Apply. The NURBS circle now follows the curved path when you play back the sequence. As we want to create a fuse that burns up as it's consumed by fire, we'll create the rope using an Animation Snapshot and a Loft. We'll then be able to edit the history of the lofted rope to make it appear to burn up as the animation progresses.

First, select the NURBS circle. Choose Animate > Create Animation Snapshot > Options. In the Options Box, choose Time Slider, make the increment 2 and click on Snapshot. The original NURBS circle is now duplicated along the curve. Select the circles and in Modelling Mode (F3) choose Surfaces > Loft. The result is a lofted shape that follows the curved path.

To make it appear to burn up, we need to animate the generation history of this lofted shape. Using the Outliner, select the last transformed circle. In the channel box, click on



inputs Snapshot1 to see the Start Time and the End Time of the animated snapshot. At frame 1, key the start frame to 0 by right-clicking and choosing Key Selected. Go to frame 360 and make the Start Time 360. Set another keyframe here. Play it back. As the start of the Loft gets nearer to the end of the Loft, the shape disappears through time.

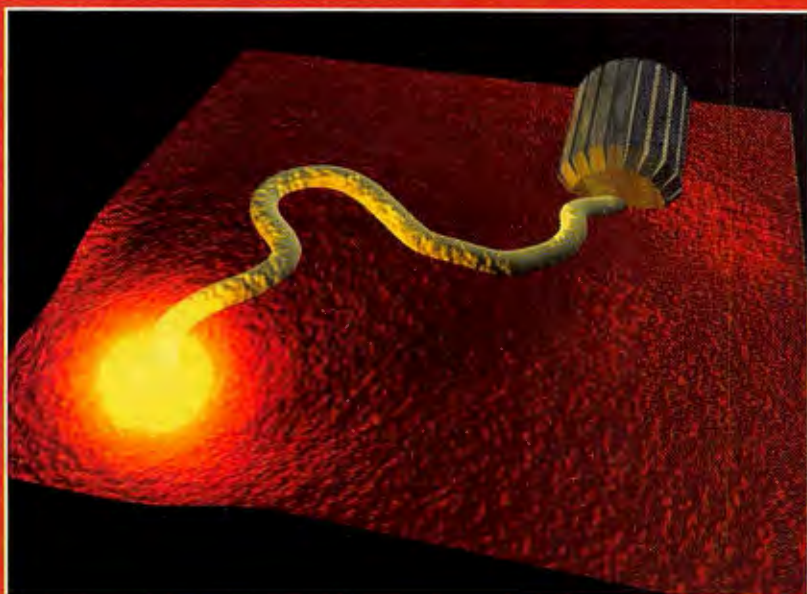
To add some flame, create a NURBS Sphere with a radius of 0.5. With the sphere selected, Shift-select the original CV curve you drew on the NURBS plane. Go to Animate > Motion Path > Attach to Motion Path. The Sphere now follows the path at the same speed as the lofted rope is consumed. To add fire to the Sphere, go to the Dynamics Menu set (F4). With the Sphere selected, click Effects > Create Fire > Option Box. Set the Fire Emitter Type to Surface, set the Flame Start Radius to 0.4 the Flame End Radius to 6.0 and make the Fire Intensity 0.6. Click Apply.

Finally, parent a point light to the Sphere emitter and keyframe the intensity of the light and the colour to make it flicker through the sequence. Now all you need to do is light the touch paper and stand well back...

BY GEORGE CAIRNS

ABOVE Create the lofted rope shape as an Animation Snapshot. It's made to burn up over time by editing its generation history.

LEFT The flame emitter follows the same CV path used to create the lofted shape. Check out the movie on the CD for some sizzling hot fuse action.





How can I create a spray-paint material that appears metallic or pearlescent in *3ds max 4*?

JENNIFER BAKER, VIA EMAIL



Spray-painting a car surfaces in actually a two-stage operation: the application of a paint colour of effect, and then a protective lacquer or wax. This dual layer has a curious effect on light – by creating two highlights: a large faint highlight from the underlying paint, and a small intense highlight where the lacquered surface is illuminated.

Thankfully, creating this effect in *3ds max* is quite simple because the software comes ready-prepared with a Multi-Layer material. This enables you to pick the appropriate colour, amend both layer highlights, and add a Raytrace map in the reflection slot. Simple. By observing real world examples, you should also note that the reflection in a car is slight when viewed full on, but more intense at the perpendicular. Therefore, you should mask (or mix) the Raytrace map with a Fall-off map set to Perpendicular/Parallel, with the Raytrace map located in the Side slot.

Observe a pearlescent painted car – or other object with similar properties, such as a shell or ornament – and you'll notice that the pearlescent effect only appears on the perpendicular and when light is shining on it. Also, if the object is rotated, any colours that appear are normally distortions of the reflected image, and stay in the same place when the object is rotated back to the same position. You need to re-design your spray-paint material to reflect such an effect.

Because the base coat is metallic, it should be created as such. Create a metal material to emulate this, with the base colour selected in the Diffuse colour slot as before. Because the base coat of these types of paints is slightly rough, you should also create a noise bump map. The fall-off colours can be whatever you like – greens to purples, reds to yellows – it all

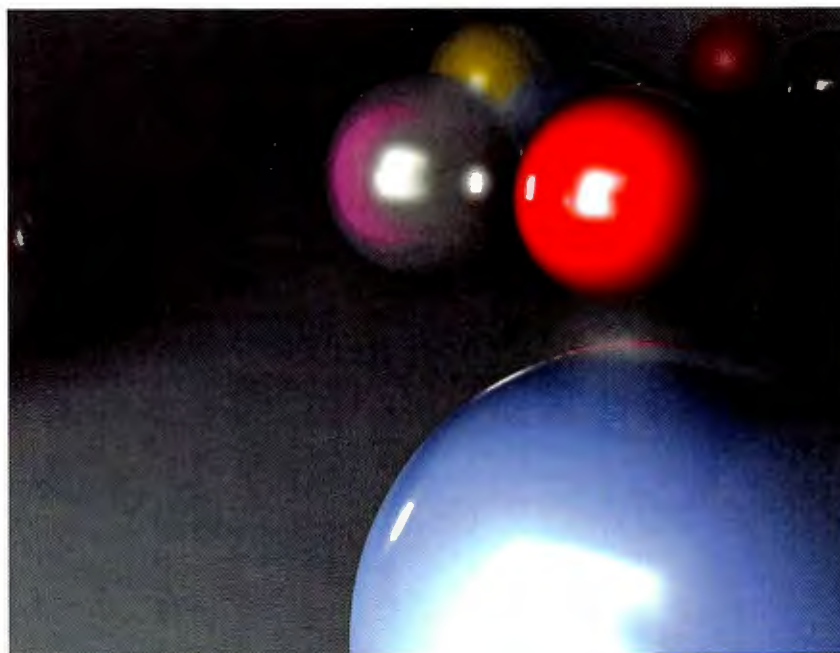
BELOW LEFT The core elements of the pearlescent material. These are composited together using either a Composite or Shellac materials.

BELOW RIGHT A simple scene displaying the material reacting to light. Note the reflections fall off to the centre as with the pearlescent effect, yet still reflect in the other spray-painted objects.

depends on what you want. To make these, create a Fall-off map set to Perpendicular/Parallel, with another Fall-off map in the Side slot, set to Shadow/Light. This prevents any reflections being emitted from non-lit areas. Create a Gradient Ramp material in the Light slot and set the Gradient Type to Normal to change colour on the object's perpendicular. Composite this material with a copy of the original spray-paint material that has been set to zero per cent opacity, and the Fall-off and Raytrace map reflections remain intact.

This now provides us with our lacquer reflections and base coat reflections. You may wish to amend the position of the Gradient Ramp material to the Specular Colour of a single Multi-Layer material and play with the settings. Also, don't forget to have a go at amending the Fall-off and Anti-Aliasing parameters (after turning Global Anti-Aliasing on) to create blur effects, depending on distance, which adds more realism to the lacquer's reflections.

BY PETE DRAPER



RENDER SHORTCUTS

DUE TO THE AMOUNT of anti-aliasing in the Raytrace maps (and the composite material), the resulting render may take a long time to complete. To rectify this problem, turn off anti-aliasing in the Raytrace map's anti-aliasing parameters, and turn on supersampling. Supersampling smoothes out any jagged aliased reflections, but sacrifices any blurring of reflections. To speed up the render further, turn supersampling off.





HORROR IN MOTION

A short story by HP Lovecraft prompted professional video game animator Geoffrey Clark to fashion his most recent award-winning CG short... **BY CLARE LYDON**

ABOVE AND RIGHT George Birch, the 'hero' of Lovecraft's story, is a lazy, selfish and irreverent gravedigger who's forced to change his ways when he suddenly finds himself trapped in a crypt.

You might imagine that living and working in the California Bay area, with all that sunshine and Pacific Ocean spray in the wind, would trigger happy endorphins in a filmmaker – inspiring delightful movies about flowers, free-time and New Age crystal-hugging. Not a bit of it. Geoffrey Clark's chosen genre thus far is horror, although he's clearly appreciative of where he comes from: "I'm definitely blessed to live in such a wonderful place," he laughs.

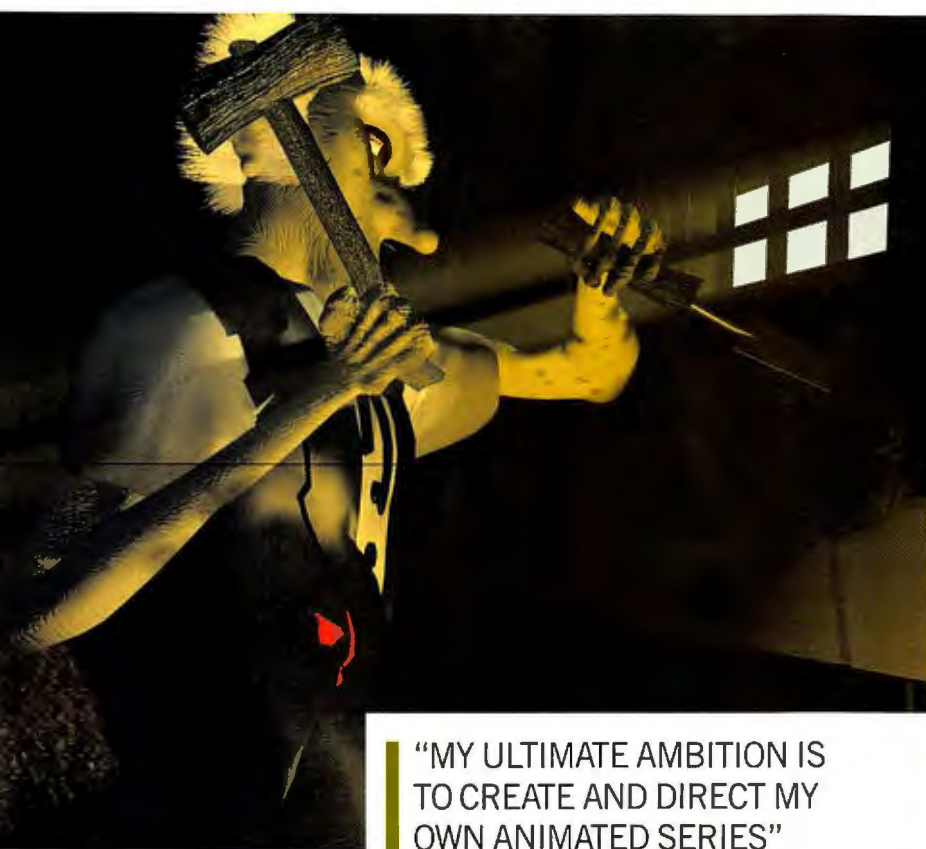
The 30-year-old 3D animator currently resides in San José, working at The 3DO Company as a video games animator. But when he's not modelling for gamers, Geoffrey engages his twilight passion for animation at home: "I've always been a storyteller," says Geoffrey. "I made my own comic books when I was growing up, and I also love computers. I began animating my first walk cycles on my family's Mac, typing in long lines of code for each frame."

To date, he's produced two short films. The first, *Back to Ye Olde Drawing Board* was started as part of a college project; but it's his most recent work – *In The Vault*, a film adaptation of the



HP Lovecraft story of the same name – that's turning heads both on and off the Internet. The story revolves around crusty old undertaker George Birch, who isn't the most conscientious or respectful of workers. One day, he gets locked inside a burial vault, and as he tries to escape, the dead take their revenge and attack him, prompting the hero to rethink his work ethic and change his ways.

"*In The Vault* is my favourite Lovecraft story," says Geoffrey, "and it's perfect for 3D animation, with one character who spends his time pushing and pulling items. It also takes place in



"MY ULTIMATE AMBITION IS TO CREATE AND DIRECT MY OWN ANIMATED SERIES"



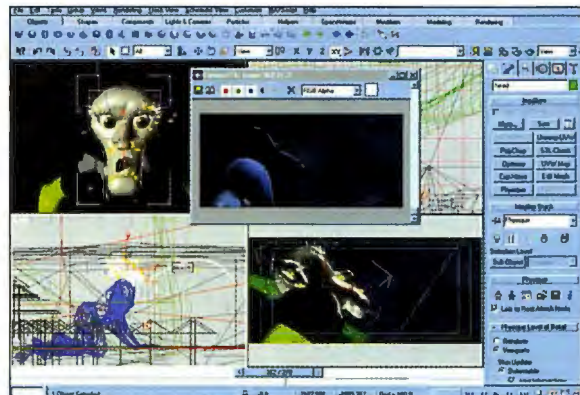
only one location, a graveyard, which minimises modelling. I love George's character, and once I got him modelled, the ideas really started to flow."

But before Geoffrey sat down in front of his PC, he worked out concept drawings and storyboarded the entire film from scratch: "It's a crucial step, even for one-man films," explains the animator. Acting out the motion was another important technique. "Get your body moving to understand what you're trying to capture," he advises. "For instance, there was one shot where George drops a casket on his foot, then jumps up and down in pain. I acted that out over and over, and the finished shot is a great piece of acting. I also use a stopwatch to time movements, because they're often quicker than you think." Geoffrey also recommends making many previews of a shot, to ensure you achieve fast, real-time feedback for the timing of your movement.

"For *In The Vault*, I purposely created the set geometry to be very low-poly," he reveals, "because I wanted to be able to hide and unhide objects quickly. I sacrificed some geometric detail in order to work quickly." He also avoided environmental details like grass simulation. "The character's motion and acting were of paramount importance."

Geoffrey created *In The Vault* using *3ds max 2.5* and *3.1*, *character studio* for the character motion, *Shag:Fur* for styling George's hair, and *Organica* for fashioning his head and arms. But the artist still owes his biggest debt to every animator's

RIGHT Geoffrey Clark modelled George, the graveyard and its night-time terrors using *3ds max 2.5* and *3.1*.



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CREDITS *Back to Ye Olde Drawing Board*, completed in 2000. View the films at: www.ifilm.com/ifilm/people/people_index/0,4128,251341,00.html

stalwart companion: *3ds max*. "It's got every feature an animator might need to do great work – I've used it so long that it's become an extension of my brain!"

Just over two years in the making, *In The Vault* was something of an endurance test for Geoffrey: "Along the way, there were ups and downs in inspiration. Making a film is solitary work, just you and the computer – but I'm happy I did it."

So does he have plans to strike out as the next Tim Burton? While Tim's certainly a hero of Geoffrey's – as is the creator of *Invader Zim*, Jhonen Vasquez – for the moment he's happy animating for games. However, he'd like to branch out into animated film at somewhere like PDI or ILM in the future, to take his storytelling to the next level.

"My ultimate ambition is to create and direct my own animated series," Geoffrey states. Right now, he's germinating more film ideas, and has an idea for an animated series with a working title of *Ice Asylum*. In the meantime, he's happy to continue creating, and see where his work takes him. "We're only just beginning to see the possibilities of 3D animation," he concludes. "It will be interesting to see what comes next."



Technology versus talent

As 3D software reaches new heights of complexity, are we in danger of cultivating inferior art and stymying creativity?

BY ALAN BASSETT

The increasing implementation and acceptance of 3D animation in the commercial arena is accelerating the advances in computer animation software at a dizzying rate. Projects like *Walking with Dinosaurs* and *Walking with Beasts* are opening the public's eyes to the enormous creative potential of 3D animation. And good job too.

But while innovators push the envelope to the nth degree with the concept of the 'virtual' presenter, I'd argue that we're taking 'progress' to the extreme with the idea of 'virtual' actors. Understandably, studios may want to save themselves exorbitant actors' fees – but what is the point of bringing back, say, Monroe or Bogart in a virtual context? Just because you can doesn't mean you should...

Equally, as the technology becomes ever more sophisticated, my real fear is that cutting-edge talent and innovation will give way to mediocrity as more artists rely on the software rather than their own talent. Previously, 3D animators had to work extremely hard and draw on their innate creativity to define their characters with the tools

available. Today, sadly, I'm often faced with graduates who present their craft as more a painting-by-numbers exercise than a capable demonstration of creative flair.

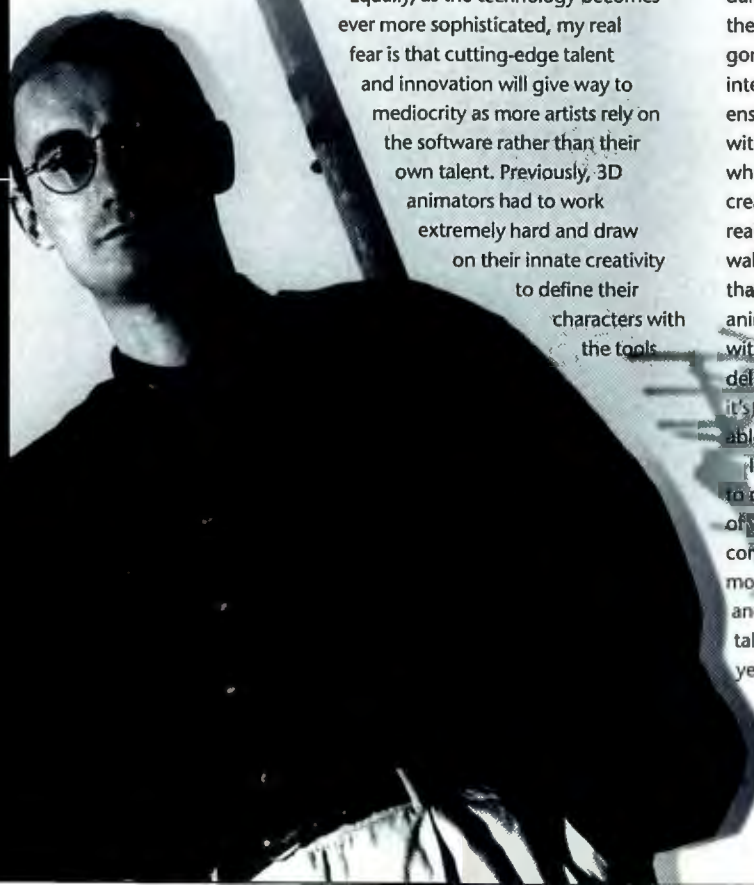
I'm all for the software creating opportunities and enabling artists to consider animation as a potential career path. The problem is that poor quality animation opens up the artform to anyone who believes it's easy to animate. The outcome, I fear, will be inferior work from operators who lazily 'operate' the software rather than exploiting its potential in a more creative way. This approach

can only lead to a disappointed client or worse, a client who believes the end sub-standard quality of the piece is actually acceptable.

When I interview potential candidates, I'm looking for evidence that they can model a character, a cereal pack or a teapot. Some dark six-minute film, all in the same style and using the same techniques, invariably displaying guts and gore, doesn't demonstrate tangible proof that the interviewees can deliver creatively-led 3D animation enshrined in a real commercial environment, and with a relevance to the types of commercial on which we're briefed. Our clients are asking us to create mice with fur that moves and shines like the real thing, breaking waves with realistic sea foam, walking, talking household objects or characters that look and move in a realistic way. Furthermore, animation of this type has to be completed often within a matter of days to meet critical deadlines for delivering a new commercial to the marketplace, so it's vital that animators have the inherent skills to be able to achieve that high level of realism quickly.

I, for one, would welcome the opportunity to discuss with animation colleges the benefits of working more closely with 3D animation companies, so we can deliver courses which have more relevance to the commercial environment and encourage potential animators with creative talent. There's a tremendous amount of innovation yet to come out of the UK in the CG arena, and we must all continue to champion for and nurture high artistic creation rather than accept off-the-shelf mediocrity.

ALAN BASSETT is co-founder and director of animation company HR3d. He has created commercials for Ribena, Milky Way, Kellogg's and more.



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mental ray for Maya

The industry standard finally acquires a renderer worthy of it...

BY SIMON DANAHER

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MAIN FEATURES

- Translates and renders most of Maya's features using *mental ray*.
- Caustics
- Global Illumination
- Final Gather
- *mental ray* tessellation and displacement
- Fully scalable
- 3D motion blur
- Raytraced depth of field
- Area lights

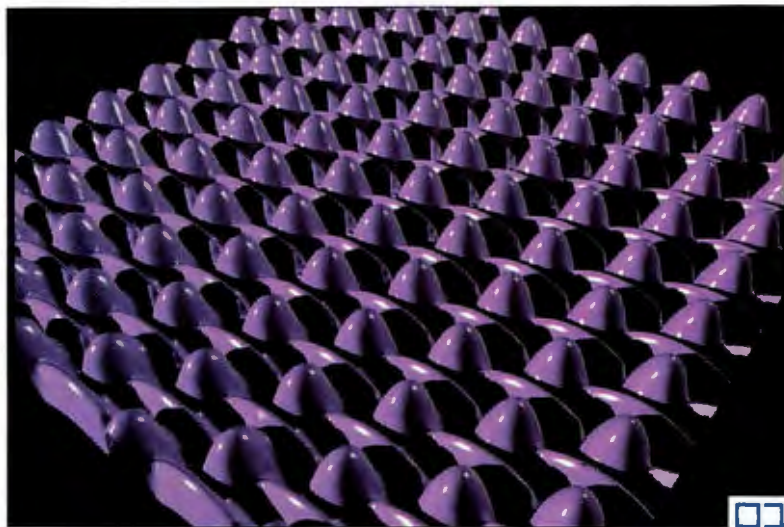
As many people know, *Maya* is a formidable 3D animation system, used on everything from pop promos to effects-crammed multiplex fillers, but its renderer still leaves a lot to be desired. It's not bad by any means, but it should be a whole lot better, given the quality of the competition. Plus it can be very slow. Competing products such as *3ds max*, *LightWave* – and particularly *Softimage XSI* – all have excellent rendering capabilities, *XSI* especially so, because it features a heavily customized and fully integrated *mental ray* 3.

So Alias, with assistance from *mental images* (the maker of *mental ray*), has made available a new plug-in for *Maya* that enables you to render its scenes using *mental ray*. The reputation of *mental ray*'s output is already well established. It's arguably the best raytracing renderer available, so it more than neatly fills the gap in *Maya*'s arsenal.

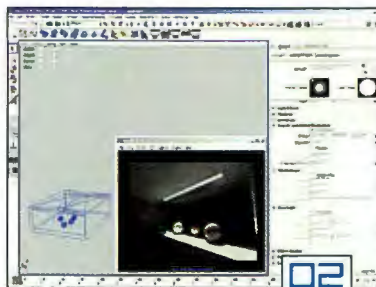
DIFFICULT INTEGRATION

One of the key questions with regard to the plug-in is integration: for *mental ray* to be more than a curiosity, it has to fit into existing *Maya* workflows. This means it must be able to translate and correctly render *Maya* materials, lights and geometry with the minimum of fuss. Once installed (no mean feat), there is a new *mental ray* menu and Render Globals which is where the main integration interface exists.

The nice thing is that you can set *mental ray* up to derive most of its settings from *Maya*'s Render Globals. This should certainly smooth over the transition for new users because *mental ray*'s render settings are quite different. However, the renderer also comes with a list of presets all its own (among them Draft, PreviewGlobalIllumination and



01



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03

ProductionMotionBlur) to get you up and running.

First, the bad news. This is what *mental ray* can't do: Fur, *Paint Effects* shader and light glow, and 2D motion blur... Basically, any *Maya* post-render effect. Neither can it deal with volumetric effects, Image Planes, any particle effects, including instancing, or the rendering of Subdivision Surfaces directly. More of a concern workflow-wise, it doesn't support Render layers or Passes, noise and volume noise shaders, Field rendering or IPR (no surprises there, though). These limitations may sound severe but there is good news. *mental ray* provides Area lights (faster than

Maya's), Global Illumination and Caustics rendering, plus superior anti-aliasing and speed. How much speed? Well, your mileage may vary of course but a quick test using a moderately dense scene featuring reflections resulted in a *Maya* render time of 94 seconds, while *mental ray*, with the exact same settings churned out the frame in, wait for it, 19 seconds. Whoa! That's quite an improvement. Five times better, in fact.

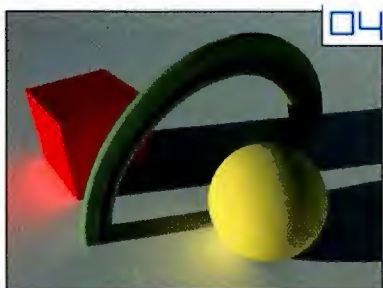
Basically, the *mental ray* plug-in, while not providing all the *Maya* frills just yet, gives you better quality images in less time. It doesn't take a genius to work out the implications for a production facility... There is a snag, however, and that's the prohibitive cost of licensing.

In most cases, *mental ray* (or rather the plug-in which does all the translation)

[01] *mental ray*'s tessellation options are more controllable than *Maya*'s and produce exemplary displacements.

[02-03] The plug-in extensively enhances *Maya*'s rendering potential.

THE NICE THING IS THAT YOU CAN SET MENTAL RAY UP TO DERIVE MOST OF ITS SETTING FROM MAYA'S RENDER GLOBALS, WHICH IS HANDY



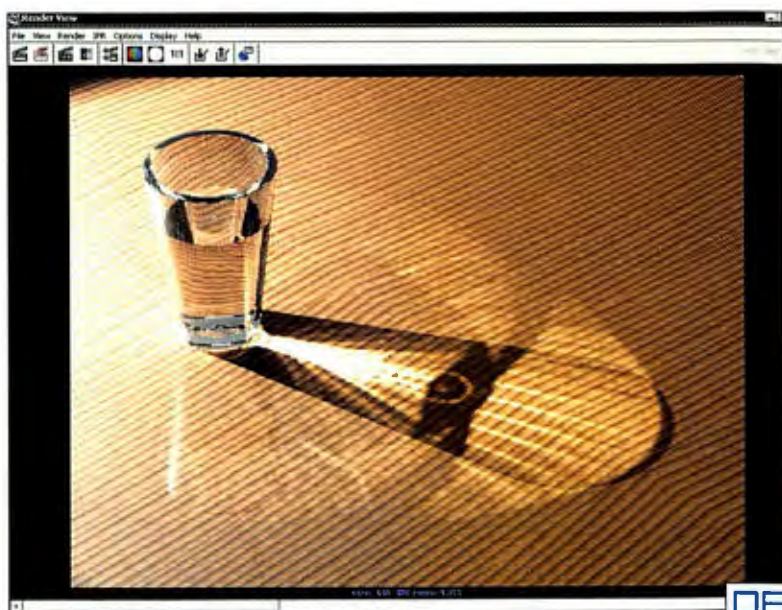
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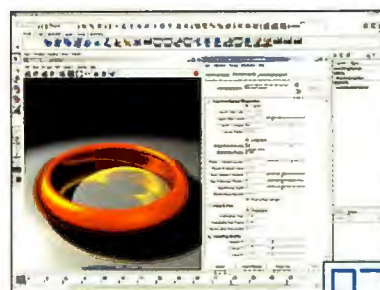
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[04] *mental ray's* Final Gather produces excellent photorealistic results. Global illumination is another feature available.

[05-07] *mental ray's* is justifiably famous for its range of features and quality of output – and the *Maya* version is no exception.

[08] You can use *mental ray's* Caustics to create truly photorealistic results, taking into account the distribution and focusing of photons.

to get to grips with. The key areas of concern remain the lack of supported features, integration of footage with effects rendered using *Maya's* own renderer, and the cost of multiple render licences. It's also only available for Windows and and IRIX systems. If delivering high-quality, photoreal images on time are the most pressing concerns then it's likely *mental ray* will be an economical solution in the long run.



supports *Maya's* shading networks, save for the noise and volume noise shaders. You can, of course, bake these into a map and still use them. There will be slight differences in some of the shaders, mostly to do with filtering, but things like anisotropic shader will only appear the same on NURBS surfaces. Lighting should be exactly the same, and this appeared to be borne out in our tests.

What you do get, though, is superb Global Illumination, plus *mental ray's* Final Gather feature, which produces global illumination effects very quickly using photon maps. The two can be combined to optimise speed and quality – and the results are always astounding. There's also Caustics, of

THE RAYTRACING EFFECTS PROVIDE INCREDIBLY ACCURATE 3D MOTION BLUR

course, which replicate the effect of reflected (or transmitted), focused light on surrounding

objects. Again, the results can be quite stunning. Furthermore, the raytracing effects in *mental ray* provide incredibly accurate 3D motion blur, and depth of field – which is visible in reflections and through transparency too.

DIFFICULT PROPOSITION

To sum up *mental ray* for *Maya* is difficult. The quality is pretty much assured, and the integration, while incomplete, has been well executed. There's still the old problem of render flags and controls being spread out through different parts of the interface, but generally it's simple

3Dworld Verdict



PROS

- Production-proven render quality
- Better tessellation and displacement
- Caustics and Global Illumination • Fast

CONS

- Pricey • Post-render effects not supported
- No interactive rendering

Vue d'Esprit 4

The award-winning landscape-maker hits the Mac, but it's not always a pretty sight **BY STEVE JARRATT**

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MAIN FEATURES

- Mac OS X compatible
- New interface design
- Volumetric clouds, lights and materials
- User-definable lens flares
- Stellar objects
- Updated 'SolidGrowth' vegetation engine
- Luminous and glowing materials
- Increased render speed
- Poser scene file import
- QuickTime VR export

[01] A rather chocolate-box scene, replete with cherry tree and an array of primroses.

Unlike *Bryce*, each primrose is 'grown' individually, so every one is different.

[02] There are 30 SolidGrowth™ plants, shrubs and trees provided in the library, although it's surprisingly easy to grow tired of the presets and yearn for a greater variety.



SOLIDGROWTH™ 2
FEATURES SOME
30 DIFFERENT
PLANTS AND TREES

The advent of OS X has seen something of a renaissance in the Macintosh graphics market.

As well as updated X versions of the popular 3D apps, a whole slew of hitherto PC-only programs have been converted, including some big titles like *Maya* and now *Vue d'Esprit*. So while version 4.0 is a point upgrade for PC users, on the Mac it's a completely new application.

Of course, the appearance of *Vue 4* may not be to everyone's liking. Corel – the new developers of *Bryce 5* – have good reason to worry. On the Mac, *Bryce* has long been in a market of one, and in terms of feature-set, the two programs now go squarely head-to-head.

Vue d'Esprit is ostensibly a natural landscape generator. It creates fractal-based terrain, uses procedural shaders to impart realistic looking rock and water textures, and then illuminates and shades the landscape according to user-definable atmospheric effects. So far, so *Bryce*. But *Vue* has attracted much acclaim for its SolidGrowth™ tree and plant generator, which not only produces realistic vegetation, but also renders with speed. A similar feature in *Bryce* has been met with protracted render times.

SolidGrowth™2 adds extra detail to its plants and trees, and replicates the variety of colours found in nature. SolidGrowth™

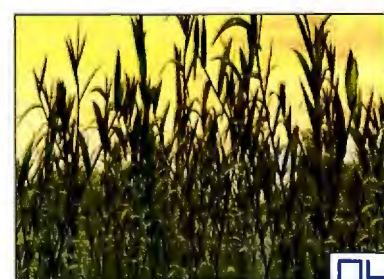
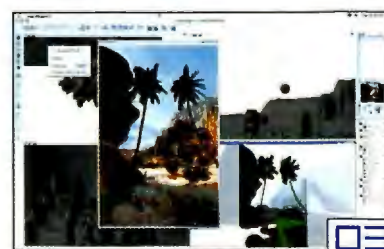


2 features some 30 different plants and trees – and, unlike *Bryce*, repeatedly clicking on the icon generates a new variant on the same flora, which makes creating a dense, naturally random forest or flowerbed child's play.

BRYCE BEATER?

Vue 4's interface is a compromise between Windows and OS X; the pale blue buttons and icons fit well with the Mac's Aqua interface, although don't strictly adhere to Apple's guidelines. The biggest culprit is the Open/Save dialogue which merely replicates the standard Mac OS panel; it's not a major problem, but doesn't support the Apple-D desktop command or Favourites. Similarly, many of the other windows are modal and can't be shrunk into the dock.

The work area provides four OpenGL panes (three views, plus a camera view),



with a double-click option to expand any one to full-size. The palette running down the right-hand side neatly incorporates the function *Bryce* users will know from the left-hand side, with a thumbnail preview and some fiddly camera controls. However, *Vue* also adds a materials preview and a object browser with layers. This provides quick access to objects and helps keep things tidy: when a scene gets too busy, you can easily toggle layer visibility on and off.

Of the many new features in *Vue 4*, the most notable is volumetrics, which really



[08] The new 'stellar objects' are, frankly, unimpressive. They're just 2D objects that always stay face-on to the camera.

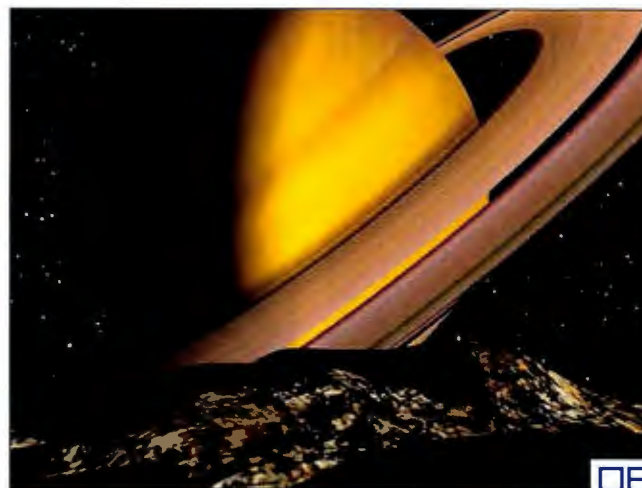
[09] Volumetric spotlights have visible cones and cast authentic volumetric shadows. You can also apply a texture to the cone itself, to give the light some 'body'.



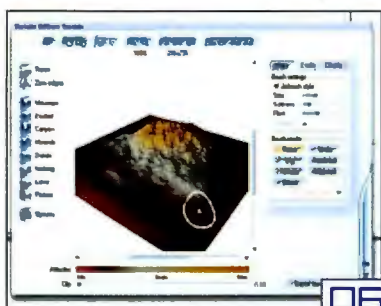
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Corel took something of a retrograde step. It incorporated a host of CPU-intensive features, yet failed to provide multi-processor support (you can now render across machines, but most Bryce users are single-machine hobbyists). Scene for scene, and especially running on a new dual-processor G4, Vue is simply streets ahead in terms of render times.

GLITCHES AND BUGS

But the good news ends there. In Mac terms, *Vue d'Esprit* is really version 1.0 – and it shows. The application is liberally riddled with bugs and glitches, many of which prove fatal. Among the more serious problems, the version on test failed to import any of the following object type: *LightWave* lwo files, *Poser* .pz3 files,

(despite the much-vaunted hosting of *Poser* scenes) or even .obj files from the Extras CD. Equally serious is the failure to save

image files correctly (saving tiffs often crashed the app).

The list continues... Terrain export prompts crashes, as does moving and editing lights; the camera view refuses to render properly; the cursor keys are ineffectual; the interface refuses to redraw after being hidden; mixed materials can lose their bump-mapping; files sometimes don't save properly; material alpha channels occasionally malfunction,



09

booleans sometimes don't work... E-on has already posted a somewhat hasty *Vue 4.05* beta patch, but when installed it rendered *Vue* utterly useless – the application wouldn't even load and required a complete reinstall.

Vue d'Esprit 4 is a welcome addition to the growing cadre of 3D apps on the Mac, but unlike the PC version, it's too buggy and unstable at present to be worth considering.



3Dworld Verdict



PROS

- Fantastic volumetric skies • Extensive feature-set • Speedy rendering

CONS

- Nowhere near being finished on Mac
- Non-DS X interface elements • On-line help underwhelming

adds a new level of realism to *Vue* scenes – from volumetric skies (for glorious dusk and dawn scenes) to volumetric lights with visible, textured rays. In addition, it now creates caustic reflections, luminous, glowing materials and lens flares, so you can add subtle lighting effects without the need for post-production.

A less useful new feature is the stellar objects library – rather staid versions of the nine planets, which consist of 2D objects linked to the camera, so they always remain face-on. These are rather cheesy (Jupiter, for example, is a pixelly bit-map photo) and most serious artists will probably avoid them in favour of creating their own.

Overall, *Vue 4* now shares many features with *Bryce 5*, and in terms of feature-set, this update levels the playing field still further. There are some things *Bryce* still does better (its sky and terrain editors, for example), but with version 5,

UNFORTUNATELY, VUE 4 MAC IS LIBERALLY RIDDLED WITH GLITCHES

[03] *Vue 4*'s interface consists of four OpenGL panes, with a slender palette running down the right-hand side. Objects can be colour-coded, too. The currently selected object is highlighted with a red wireframe.

[04] This simple image is the bamboo preset, with a couple of hills, a preset sky and some water. *Vue*'s detailed vegetation stands up well to closer scrutiny.

[05] Another demonstration of *Vue*'s Depth of Field feature. The focal point appears in the OpenGL views as a marker extending from the camera.

[06] The Terrain Editor enables you to edit mountains in real time, and 'paint' features on, such as peaks, indents, erosion effects, rocks, and so forth. It's a close call, but *Bryce 5* just has the edge in the terrain-editing stakes.

[07] *Vue 4*'s caustics engine is extremely fast, and the results are reasonably realistic.

Dell Precision M40

Precision by name, precision by nature, Dell's portable 3D studio is impressive

BY MAT BROOMFIELD

PRICE £2,814
(\$3,968)

SUPPLIER
Dell

CONTACT
0870 907 4155

WEB
www.dell.com

MAIN FEATURES

- Pentium III 1.26GHz
- 512MB SDRAM (not upgradeable)
- 32MB Nvidia Quadro2 Go graphics processor
- Dual-screen display
- 1600 x 1200 LCD UXGA display
- 48GB ATA 100 hard drive
- Modem
- 10/100 Network
- Integrated 8x DVD-ROM and combined CD-RW
- Smart Li-Ion batteries (3hr duration)
- Floppy drive
- FireWire
- 3-year on-site warranty
- Touchpad and nipple controllers built in



Laptops have been around for years, yet it's taken a surprisingly long time for a company to come up with something that offered workstation-class 3D performance, enabling CAD, animation and 3D users from all disciplines to work on the move. But with the M40, Dell has come up with a solution that could satisfy many budding artists-on-the-go.

The Precision M40 is an impressive laptop in a number of ways, sporting a 1.2GHz Pentium III processor, backed up by 512MB of PC133 SDRAM memory. Unfortunately, neither the processor nor the memory can be upgraded, and for 3D users, the memory limitation is more likely to be an impediment than the processor.

GRAPHIC DEMONSTRATION

The key component for 3D users is the remarkable graphics processor, a 32MB Nvidia Quadro2 Go GPU, which is a remarkable example of miniaturisation, offering Quadro performance on a small, low-voltage chip. Even before you look at the 3D performance stats, it's an attention-getter. For starters, the laptop's default resolution is 1600 x 1200. Hardly unusual on a desktop machine, sure, but on a 15-inch LCD that depth of resolution really is quite something, enabling you to maximise your applications and move around your workspace without constant resizing or shuffling.

Another benefit of the graphics chip is that it supports dual displays. Connect a monitor up and you can run multiple applications or optimise your workspace – perhaps with your current program's controls on the laptop screen and your working space on a CRT display. Because it has a UXGA TFT panel, the M40 has no trouble with a full 32-bit palette either.

These days, 32MB is the entry-level memory requisite of a 3D card, but with the M40, which is best run at 1600 x 1200, this RAM has even further to go. It

PERFORMANCE AND DEPENDABILITY

ONE OF THE BIG ADVANTAGES when it comes to buying a laptop is that you're unlikely to experience the same compatibility and upgrade issues that so often bedevil desktop systems. The reason is simple: you don't upgrade laptops in the same way – if at all. The system is built by the manufacturer with a specific set of components inside and the drivers are optimised for those components to get the very best from them.

When benchmarking this system, we were surprised to find it outperforming systems that on paper were supposedly superior (a Pentium 4 1.7 and a 1.2GHz Athlon, for instance).

While we don't place too much faith in benchmarks generally, we can only attribute any performance benefits to a well-optimised hard drive and an ATA 100 drive controller, a good-quality fast RAM and a well-designed AGP 4 graphics card.



wouldn't have hurt Nvidia to include more RAM or find a way for the chip to access system memory to make it a little more flexible. Nevertheless, the chip remains a very capable performer, and in our benchmarks exceeded the GeForce 2 GTS.

Better still, the Quadro2 Go comes with certified drivers for many applications, and includes Nvidia's Maxtreme drivers, which provide optimised OpenGL performance, yielding up to 15 per cent more 3Ds max speed than its standard drivers.

GREAT 3D SOLUTION

Weighing in at over 3.5 kilos, the M40 is hardly a laptop you'll want to lug around on a walking holiday across the Lake District, especially as Dell stingily omitted to include any kind of carrying case. But then with its big screen, fast processor and 48GB hard drive, it is being classed as a desktop replacement. Of course, the upside of this is that you'll have no trouble using it in the office as your primary business machine, and then taking it out on trips or on-site.

To help simplify this transition from office to mobile, the M40 is compatible with two types of docking station: the full

bay costs another £390, but at least it enables you to connect PCI cards, extra floppy drives, CD-ROMs, etc. This sits permanently on your desk, perhaps connected to a monitor and a full-sized mouse and keyboard, and you just slot the M40 into it when you're in the office.

The computer uses long-life smart 59 Watt Lithium-Ion batteries, which in our tests lasted three hours with the screen on maximum brightness and all power-saving turned off. Activities such as 3D processing and DVD-ROM access could significantly reduce this figure, but dimming the screen and engaging all power-saving modes should compensate. And if you require longer, you can always remove the floppy drive from the front of the device and double your working time away from the mains. When you do find yourself near an outlet, the machine offers a fast-charge mode that replenishes the batteries in just one hour.

Extensive connectivity is an important feature of the M40. A 56K modem comes as standard, of course, and there's an IEEE1394 four-pin FireWire connector so you can capture video on the move. A great feature if you want to incorporate video backgrounds into your work – if you're at a client's site, for instance, and you want to show them how your new design fits into their existing architecture or landscape. A 100Mbps network port,

so you can hook up to your office network for backups or data transfer, is also included, as well as a high-speed infrared receptor for wireless communication. If you want to leave a sample of your work with someone, the M40's 8x speed DVD-ROM doubles as an 8x speed CD-RW drive, so you can burn CDs on the move, too. In addition to the FireWire port, the M40 boasts a single PS2 port, which you

DEFINITELY AN OBJECT OF DESIRE FOR THE PRO ARTIST, EVEN IF THE RAM IS A TOUCH ON THE SMALL SIDE

can use for a mouse or keyboard, two USBs and two type 2 PC Card (PCMCIA) slots for additional mobile peripherals.

Dell's Precision M40 is definitely an object of desire for the 3D pro who's going places. It's powerful, capable and beautifully designed, even if the RAM is a touch small. A great 3D solution.



3Dworld Verdict



PROS

Powerful laptop with 3D capabilities
• Long battery life • Feature-packed

CONS

Can't upgrade RAM • No protective carrying case • Plastic case is a bit soft



new version 7b

Macintosh OS X and Intel Pentium 4 optimised

LightWave 3D®

S E V E N



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Pixel Magic



Caveboy Studios / Clemenger BBDO, Melbourne ©/© Mars Confectionery of Australia

[It's Everywhere]

It's in video games chasing international spies across your living room.

It's on TV flying starfighters through deep space.

It's in commercials for talking candies, poor abandoned cellphones, shiny new vehicles.

It's in the movies crashing cars and dodging jets.

It's everywhere in your world, and a few worlds we haven't thought of yet.



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LightWave 3D® Seven is available for MacOS 9, MacOS X, Windows 98/NT/ME/2000.



Until March 15th It's DISCOVERY time !

Buy **LightWave 3D** for only £999 + VAT instead of £1499 + VAT*.

The DISCOVERY program is a unique opportunity to **save £500** on the purchase of the best and most affordable professional 3D software.

Our references say it all

IN MOVIES: A.I., Final Fantasy, The Time Machine, How The Grinch Stole Christmas, The 6th Day, Jurassic Park III, Charlie's Angels, X-Men The Movie, Pitch Black, Dracula 2000, Titanic, 5th Element, Driven, Scary Movie 1 & 2, Tomb Raider, Star Trek, The World is Not Enough, MIB...

IN MUSIC VIDEO: Gorillaz 19/2000, Starlight / Superman Lovers, Robbie Williams / Let Love be Your Energy...

ON TV: Ally McBeal, The X-Files, M&M's commercials, American Express Blue, Gillette 2002 FIFA World Cup Logo, Dune, Star Trek...

IN VIDEO GAMES: Serious SAM, Moto Racer 3, Baldur's Gate 2, Giants, Resident Evil: Code Name Veronica, Everquest...

THE CUSTOMERS: Airbus Industries, Codemasters, Delphine Software, Digital Animations, Digital Domain, Duran Duboi, Foundation Imaging, Industrial Light & Magic, Mill Film, Movida, Passion Pictures, View...

* Recommended retail price in the United Kingdom without VAT. For pricing information in your region visit www.newtek-europe.com.

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NewTek

www.newtek-europe.com

Tree Storm 5

Want wind in your willows? Then you'd better branch out to Onyx's *max* plug-in

BY MAT BROOMFIELD

PRICE \$695
(about £400)

SUPPLIER
Onyx Computing

CONTACT
001 617 876 3876

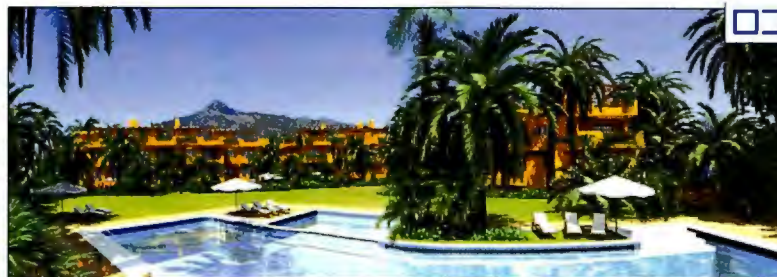
WEB
www.onyxtree.com

MINIMUM SYSTEM

- Pentium, 20MB HD, Windows 95 or higher, Parallel port or USB for hardware lock, *3ds max*

MAIN FEATURES

- Generate trees within *3ds max*
- Supports numerous tree families (not bamboo)
- Apply wind to your trees
- Customisable polygon count
- Straightforward interface
- Enables you to variegate foliage
- Texture map or not for speed



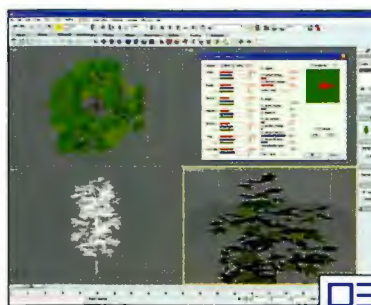
Whether you're using *3ds max* for cartoons, movies or architectural visualisations, it can be a laborious business modelling and animating your own trees. But you don't have to re-invent the wheel – *Tree Storm* can generate unique fauna for you to meet almost any requirement.

The program is a plug-in for *max*, and it doesn't come with any kind of automated installation routine. You're supplied a bunch of files on CD and a ReadMe file that tells you where to put them. If you try to discuss any installation issues with the Onyx guys, they defensively protest in broad European accents that none of their other customers have complained before.

Once the program is installed, you can add a tree to your scene just as you would any other object. Unless you specify an alternative, a default broadleaf tree is used. You can then edit this tree's characteristic, or you can specify a different variety of tree entirely. Many of the major types are represented, including palms, broadleaves, conifers, bushes, aquatics and even fantasy trees.

Unfortunately, the trees are listed only by their Latin names, with no visual catalogue for you to select from. There's another ReadMe file that translates common names to the Latin and vice versa, but this kind of lazy presentation only serves to highlight the program's lack of refinement.

Having created a tree, you can modify its every conceivable parameter: size, polygon count, trunk

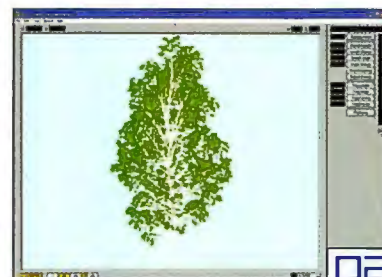


complexity, leaf variegation, texture map and more. You can also influence global changes in general form by changing the seed value – or by choosing the Random Variation button, which enables you to create a forest of unique plants with minimal tree-by-tree modelling.

BLOW ME DOWN!

The feature that really differentiates *Tree Storm* over its rival *Tree Professional*, however, is the fact it enables you to create impressive wind effects. From the lightest play of intermittent breeze shimmering through leaves to the trunk-bowing power of the strongest gale, the plug-in caters for all types of air movement. Problem is, there are no presets to get you started – and while you can create and save your own, it can be a time-consuming process, requiring much experimentation. Even this wouldn't

be so bad if it wasn't for the enormous processing burden that even a single, fully foliated tree adds to your scenes. Imagine all the calculations for



a full-blown storm and think processor-intensive rendering time...

Tree Storm is a great piece of software, but it seems to have been created by programmers, not designers. It's capable of great things, but Onyx has simply left too many rough edges intact. It needs further optimisation, further interface design and a proper installation routine. In spite of these faults, *Tree Storm* is a glorious plug-in that will transform how we think about 3D landscaping.



[01] Even without textures, *Tree Storm* trees are ideal for most generated scenes.

[02] The plug-in includes *Tree Classic*, which is a fully functional stand-alone tree designer.

[03] If you want something to rustle your leaves, it *does* come easier than *Tree Storm*...

[04] ...but at least it can wreak havoc on small shrubs as well as bigger trees.

A GREAT PIECE OF SOFTWARE, BUT IT STILL REQUIRES A LOT OF REFINEMENT

3Dworld Verdict



PROS

- Powerful, flexible and convincing
- Easy to learn
- As many options as you choose to use

CONS

- Lousy installation routine
- Very resource hungry
- No sample wind presets or tree textures to experiment with

AXELedge 1.5

A 3D Web authoring environment, boasting character animation tools and more

BY ROB CARNEY

PRICE £720

SUPPLIER
MindAvenue/Gomark

CONTACT
020 7610 8686

WEB
www.mindavenue.com
www.gomark.com

MINIMUM SYSTEM

- PC
Pentium II 350MHz,
128MB RAM, 45MB HD,
Win 98SE/ME/2000/NT 4/SP3/XP
- MAC
G3 or G4 450MHz, 128MB RAM,
45MB HD, OS 9.2 or OS X v10.1

MAIN FEATURES

- 3D Web authoring environment
- Modelling tools
- IK, FK and boning and skinning tools
- Easy-to-use Interaction Editor
- Timeline-based animation
- Cartoon, shaded and wireframe rendering
- Particles
- Movie textures
- Customisable interface

Those wanting to publish interactive 3D content on the Web have several options nowadays. Whereas most methods (*Cult 3D*, *Shockwave 3D*, *Viewpoint* and so on) require the creation of models in a separate application, and some sort of scripting knowledge (either Lingo or JavaScript) to get content online, *AXEL* from MindAvenue takes a somewhat different approach.

On opening up the application, it's immediately obvious that this is a tool aimed predominantly at 3D artists. This is borne out in the standard four-viewport workspace, complete with toolbar, sequencer (animation timeline) and context-sensitive parameter palettes. For any seasoned 3D artist, building models should be a doddle – the modelling tools in *AXELedge* are fairly standard (curves and surfaces), but there are still surprises – the Push Surface tool enables you to deform geometry on the fly, for example.

Even more surprisingly, this £720 Web-orientated app sports a full-on character animation feature-set. The intuitive tools enable you to quickly create bones – and then bind surfaces as skin in a matter of seconds. *AXELedge* also sports a fully-fledged particle system, along with the ability to quickly add collision objects. The texturing tools are well thought out, too. Options to add shaded or cartoon-shaded (flat) materials to your models are coupled with the ability to map SWF and QuickTime movies to your objects.

But where *AXELedge* really excels is with its interactivity tools. The Interaction Editor and the Sequencer hold the key to



creating all manner of interactive games, animations and presentations. The Interaction Editor takes a node-based approach – you link animation sequences to mouse-overs and so on by simply dragging connector handles.

WHO NEEDS A SCRIPT?

This visual method of linking triggers to events is a joy to use, and enables you to add complex interactions to your work without the need for scripting. Adding sensors and reactions via the Interact menu is also possible. For purists, *AXELedge* does have its own scripting language, though, and those adept at JavaScript should get to grips with the coding in no time at all. In addition to interactions, *AXELedge* also offers the ability to constrain objects to other objects or the surfer's cursor.

Publishing your work on the Web is the final stage in the *AXEL* experience – and here, too, MindAvenue has covered every eventuality in full, presenting a wide variety of options for embedding content in an HTML page. These include options to stream content (as opposed to making the visitor wait for the geometry, textures

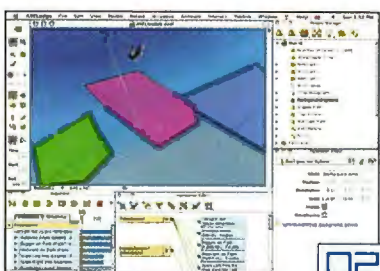
and so on to download) and also, amazingly, the ability to publish content with a transparent background, so 3D content appears above regular HTML; you can even apply a drop-shadow. Some may resent the fact that *AXEL* content requires the end-user to download a 750K browser plug-in – but, hey, with content as original as *AXEL*'s, the four-minute download on a 56K is well worth the wait.

AXELedge 1.5 is a truly remarkable, designer-orientated tool that's incredibly easy to use and crammed with high-end 3D functionality. It could well become the future of 3D on the Web.



[01] *AXELedge* 1.5 enables you to set up and animate relatively complex characters, complete with IK and FK.

[02] It also enables you to assign cartoon-shaded, as well as shaded, wireframe and movie textures to objects.



3Dworld Verdict



PROS

Extremely intuitive Web tools • Good 3D feature-set • Easy to use

CONS

The need for another browser plug-in may be off-putting

Strata 3Dpro RME

The latest iteration of the app that helped create the landscapes of *Myst* arrives

BY LUIS VILLAZON

PRICE £713

SUPPLIER

Gomark

CONTACT

020 7610 8686

WEB

www.strata.com

MINIMUM SYSTEM

- PC: 128MB RAM, 125MB HD, Win98/ME/NT/2000 or XP, Internet Explorer 4.0, QuickTime 4.0
- Mac: 128MB RAM, 125MB HD, Power Mac with System 8.6 or higher, Open GL 1.1.2, QuickTime 4.0

MAIN FEATURES

- Multiple processor support
- OpenGL support (Mac and PC)
- Velocity engine
- Real world units
- Metaballs
- Image or movie backdrop
- Inverse kinematics
- Particle collision detection
- Motion blur
- Animated lights
- Anti-aliasing

[01] The Raydiosity renderer takes into account the indirect lighting caused by diffuse reflections off nearby objects.

[02] You can expand the modelling window to fill the screen, but by default the maximise button only enlarges it to the edge of the toolbars – to avoid overlapping.

[03] For scenes with lots of reflective objects, the raytracing renderer does a better job and adjustable refractive indices enable accurate lens modelling.

The RME stands for *Rich Media Edition*, by which Strata seems to mean 'Web-savvy'. *Cult 3D* is now included and it's easy to create Web graphics by exporting objects from *3Dpro* to *Cult 3D*. You can also save your animations in *Macromedia Flash* format, as well as *Adobe LiveMotion* and *VRML*.

The modeller naturally supports all the obvious tools to create meshes and boolean operators, but you can also use the Bézier pen to draw objects and extrude them into 3D Bézier meshes directly. Additionally, for more flowing, organic structures, there's the metaball feature, which blends ellipsoids together, like melting sugar on a *crème brûlée*.

Lighting in *3D Pro* is handled in two different ways. Directional and ambient lights are added via the Lights tab of the Environment dialog, whereas spotlights and point lights have their own icons on the toolbar. There's a certain logic to this, but it does make it harder to coordinate the lighting of a complex scene, and there are far fewer effects for the environment lights.

To animate a scene, you use the project window, which presents a hierarchical list of all the objects and their attributes. Each value gets its own time-line and you simply place markers at points on the time-line corresponding to keyframes.

Strata 3Dpro then tweens additional frames as necessary. To define motion paths, you can use polylines, Bézier curves or TCB

THE ON-LINE CONTENT IS GOOD, BUT IT WOULD'VE BEEN BETTER ON THE CD

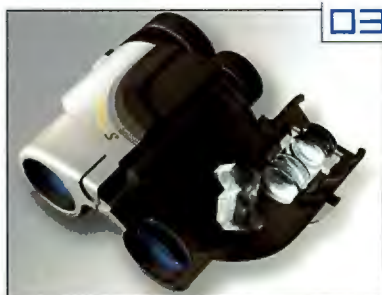


Image created by Lance Hitchings

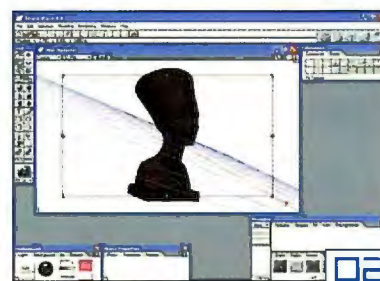
(Tension, Continuity, Bias) curves. Velocity of the object along a motion path, as well as rotational or scaling velocity, can also be tweaked at each marker point.

HELP WANTED... APPLY OUTSIDE

Strata 3Dpro is a powerful 3D app, with a strong feature-set for the price. Ironically, its strongest competition comes from itself in the form of *Strata 3D*, which is available for free as a 22MB download. One or two of the advanced editing features (such as the animation velocity control) aren't available in the free version, but the main justification of *Strata 3Dpro's*

non-zero price-tag comes in the form of four plug-ins, each with a different range of effects and transforms. These include inverse kinematics, fillet and hull tools, spline reflections and various procedural textures such as Plank, Tile and Concrete.

Perhaps the biggest weakness of *Strata 3Dpro* is its documentation. The manual is 500 pages thick and purely a reference book. The program doesn't even offer any on-screen help or sample files. You're



simply expected to visit www.strata.com via the Web-enabled toolbar buttons. The on-line content is certainly good, but it would've been better to see some of it included on the CD-ROM.



PROS

- Redesigned user-interface • Powerful animation controls • Flash export for Web design

CONS

- No sample files • Expensive compared to *Strata 3D* • Needs lots of RAM for the advanced features

Digital Beauties

A celebration of the digital female form – or cheap thrills? Have a guess...

BY ED RICKETTS



WRITER
Julius Wiedemann

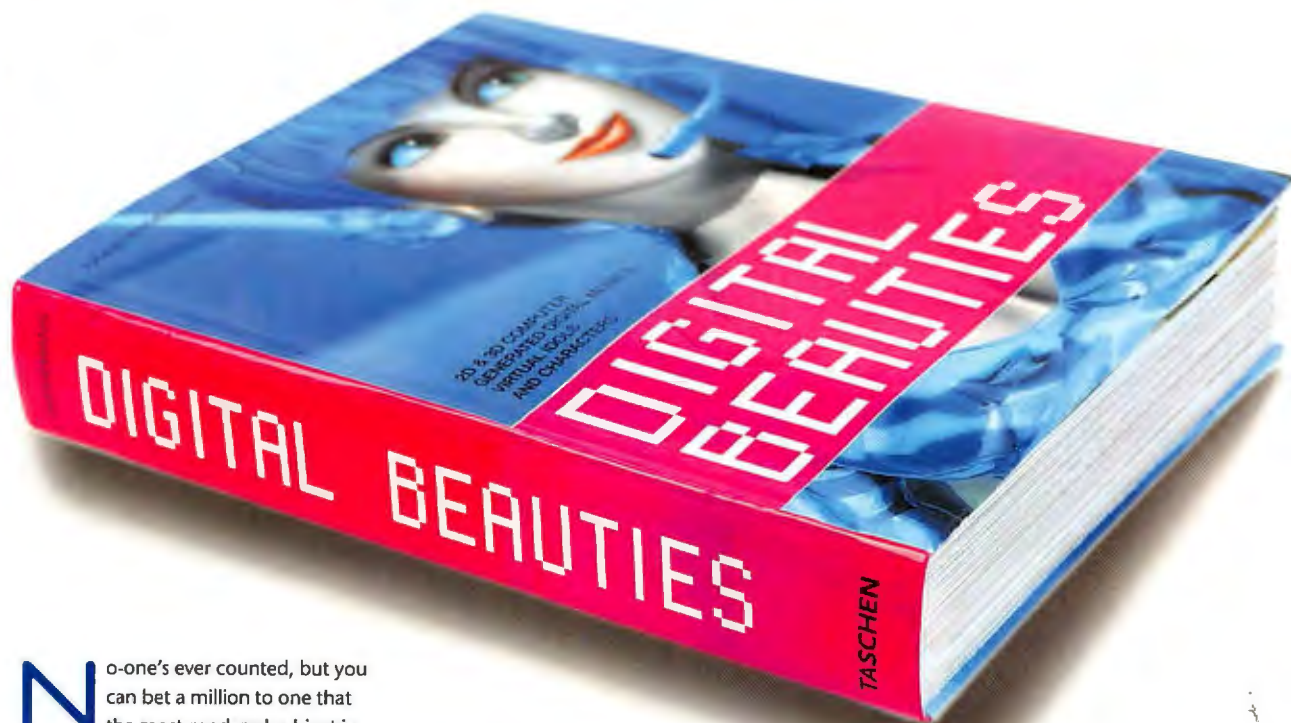
PRICE
£20

PUBLISHED BY
Taschen

SIZE
576 pages

WEB
www.taschen.com

ISBN
3-8228-1628-0



No-one's ever counted, but you can bet a million to one that the most-rendered subject in the whole of 3D has to be the female form. So it comes as no real surprise that someone's decided to release a book devoted to the subject.

But this isn't a how-to book. You won't learn any new techniques in *Digital Beauties*. It's more a coffee-table affair (and a hefty one at that), packed with full-colour images from artists all over the world, with each entry boasting a tiny and

of the virtual female body as possible, in as many male-fantasy clichéd poses as possible, than it is to explore any sort of composition. With the odd exception, such as the breathtakingly good virtual faces by Rene Morel and Alceu M. Baptista, and the craftily-lit monotone images of Francois Rimasson, the emphasis is firmly on showing synthiflesh, and plenty of it.

The overall effect is depressing. Far from "exploring the artistic achievements of today's best designers," *Digital Beauties* is simply an excuse to print semi-pornographic pictures. With many of the pictures, it's not as if the dividing line between art and porn is a thin one either; could you really argue that a picture of an almost naked woman kneeling before an enormous dildo, pointing to the ground, is anything but titillation?

From a technical point of view, and in terms of sheer commitment, all the imagery featured is amazing. As art, and

as an attempt to legitimise the rather delicate area of erotic CGI, a large proportion is absolute garbage. It's precisely this sort of exploitative junk that simply heightens the image of much CG art being obsessed with dinosaurs, robots, spacecraft and impossibly chesty fantasy figures. At least those artists who are genuinely trying to produce effective work really do stand out in this sea of testosterone-fuelled nonsense.

If you want to market a book of digital porn, fine, but at least be honest about it. Don't dress it up as some sort of artistic endeavour, because *Digital Beauties* most certainly ain't that.



THE PROBLEM WITH THIS BOOK IS THE CONTENT – OR, MORE SPECIFICALLY, THE INTENTION BEHIND THE CONCEPT

generally uninformative intro – in three languages, no less – about the creatives' influences and working techniques.

The problem with *Digital Beauties* isn't so much the quality of the work (although some of the images are rather ropery) as the content – or, more specifically, the intention behind the content. Because, for most of these images, it's obviously more important for the artist to show as much



Inside LightWave 7

The anticipated follow-up to *Inside LW6* reaffirms its status as the *LW* bible

BY BENJAMIN SMITH



WRITER Dan Ablan

PRICE £47
(\$60)

PUBLISHED BY
New Riders

SIZE
1,160 pages

WEB
www.insidelightwave.com

ISBN
0-7357-1134-8

[01] Learn how to sculpt and surface this skyscraper model...

[02] ...and discover some very impressive compositing tricks.

New Riders' latest offering in its 'Inside' series covers *LW7* and follows on from previous books covering *LW5.6* and *LW6*. Given that the application has actually changed only subtly since *LW6*, one might expect *Inside LW7* to be simply a re-release of the previous effort with the odd new tutorial patched on. Not a bit of it. Author Dan Ablan has re-written the book from the ground up, adding an extra 300 pages to an already weighty tome and honing the existing content considerably.

Inside LightWave 7 is an all-round guide, so starts small with an introduction to the interface and a tour of the app's main areas. From here it takes a project-based approach, using a mixture of short walkthroughs and tutorials to guide you through most of the tasks you'll face.

Sections common to *Inside LW6* have been re-engineered for the new interface and usually incorporate new content and examples. Brand new sections cover the non-linear animation system Motion Mixer, radiosity baking, Sasquatch Lite and the new integrated expressions.

Just about the only part repeated wholesale from *Inside LW6* is the head-



AS GOOD AS ANY SOFTWARE TEXTBOOK HAS A RIGHT TO BE

modelling tutorial contributed by Axis Animations' Stu Aitken. Ablan has updated the exercise for *LW7*'s interface, but left the content well alone, clearly believing that if it ain't broke, don't fix it. It's still a standout segment of the book and you only have to look at the proliferation of similar female faces on innumerable *LW* galleries to see how well it's been received.

An added bonus comes in the form of the appendices, which explore motion capture and provide a detailed listing of all the standard *LW* plug-ins

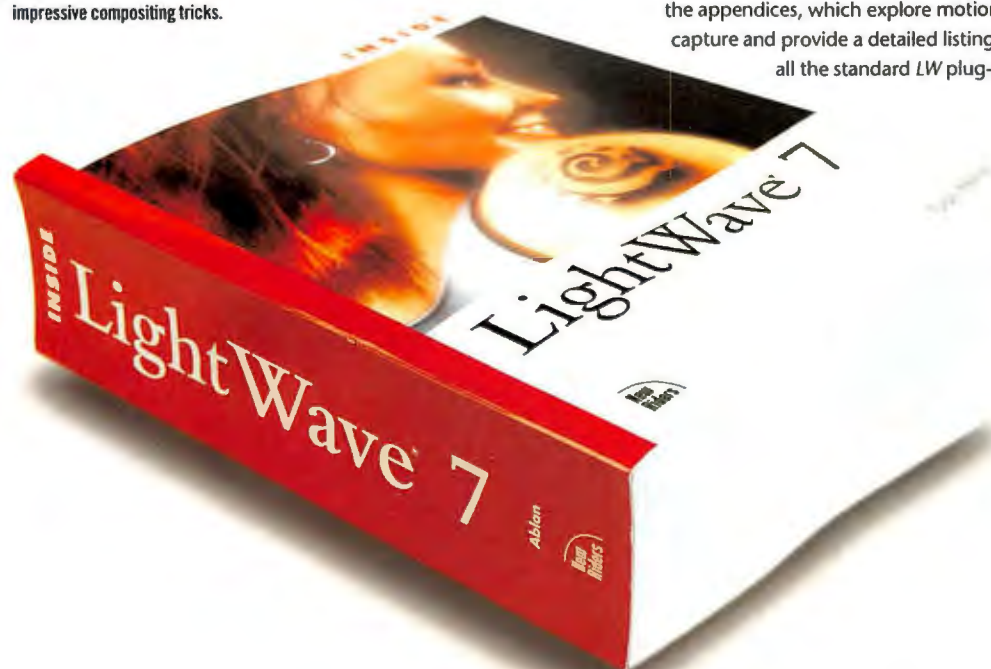


and their exact functions. This is useful and rather illuminating, even if you've been using the software for years and think you know *LW* inside out.

Just about everyone who uses *LW* has something to gain from this superlative edition, because it caters for users of all abilities. Absolute beginners will find it a far more practical introduction to the software than the cumbersome *LW* manual, while intermediate users can expand their knowledge and hone skills with some impressive looking projects. Advanced users, meanwhile, can read through some of the well-researched appendices and check out the sections covering new features. The upshot? Even if you've got *Inside LW6* already, it's still well worth investing in *Inside LW7*.

Sadly, as with its predecessor, some of the insubstantial black-and-white *LW* screenshots fail to illustrate points well, although all the pictures are reproduced in glorious colour on the accompanying CD-ROM. Needless to say, the book also weighs a ton and is thoroughly impractical to read in the bath.

Regardless of this, *Inside LightWave 7* is as good as any software textbook has a right to be.



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get a job!

Trying to break into the industry? There are many ways to maximise your chances and present the best possible work...

Like many other technology-related industries, the 3D market has felt the squeeze in the past year. With major cutbacks and some surprisingly large companies going under, it might not seem to be the ideal time to look for a job in the industry.

However, don't be fooled into thinking this is a market in recession. As 3D becomes more and more mainstream, and permeates ever more aspects of everyday life, the demand for talented 3D artists and animators is only going to grow. The key word here is 'talented'. Or, at least, you must be enthusiastic and ready to learn; companies still need to take on young artists who they can trust and nurture in the knowledge that they will deliver the results in the long term.

So now, more than ever, it pays to be informed about just exactly what any company is looking for, and how you can maximise your chances of securing a job (even if it's a part-time one). Talent is one thing, but knowing the industry and being able to convince a potential employer that you're just the wunderkid they're looking for is another.

We spoke to Lisa Cross, Recruitment Manager at recruitment and training agency Corps Business, for her advice to aspiring candidates in the industry.



Lisa Cross is Recruitment Manager at Corps Business. For more information on the company's range of services, visit the website at: www.corps.co.uk

considerable number of redundancies made over the past few months, coupled with some high profile companies going under. There are still openings for talented young designers, however the state of the market is putting increasing pressure on them. They will have to work harder in this competitive environment to find good opportunities.

3D WORLD: For work submissions, what size and format do you recommend?

LISA CROSS: The easiest way for recruitment agencies or potential employers to view portfolios is as PDFs, which can be emailed. It's a good idea to keep it to one or two pages and ensure the file size is kept to a minimum.

3D WORLD: What are the key qualifications the industry looks for? Or is it more a case of having an impressive portfolio and showreel?

LISA CROSS: A degree in graphic design/media arts etc is the standard that is generally looked for. A good portfolio and experience are invaluable.

3D WORLD: What's the most common failing you see in applicants, and what's the easiest way they can correct it?

LISA CROSS: Presenting their portfolio is a unique opportunity to convey their enthusiasm for their work and also show the background work that went with each piece – the thought processes, sketches and other interesting points to the work. I feel that sometimes designers don't make the most of presenting their portfolio to potential employers. The main factors that work wonders are the applicant's passion and enthusiasm for their work.

3D WORLD: Can you explain what Corps Business does?

LISA CROSS: Corps Business is what we like to think of as the 'all-round solution'. We offer a consulting service to provide the right solution for print and new media issues. The three sides of our business are Recruitment, Training and our New Media Studio. If a client comes to us with a project, we can provide a tailored solution to suit their needs. We can train a member of their staff at our Adobe and Macromedia authorised training centre. We can supply a fully qualified and experienced person to work on the project through our recruitment department, whether it be on a permanent or temporary contract. Or, if it's a new media issue, we can take the whole project in-house and produce it ourselves.

3D WORLD: How tight is the market for jobs at the moment? Are there still openings for enthusiastic young designers?

LISA CROSS: The market is very tight at present. There have been a



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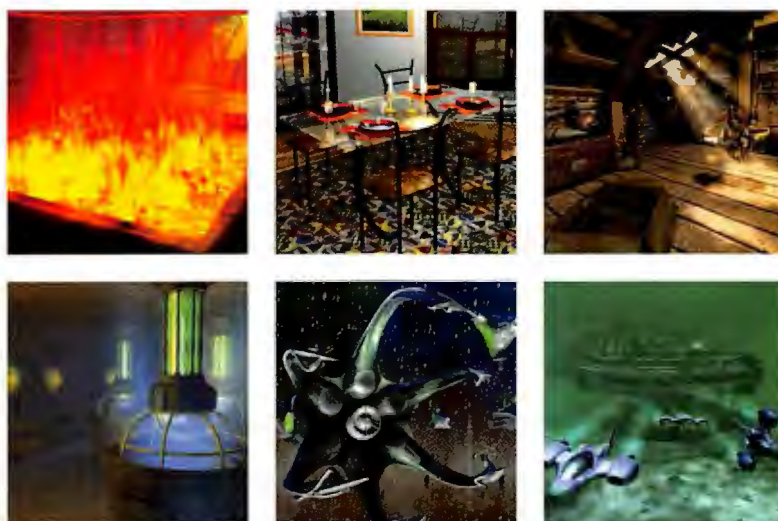
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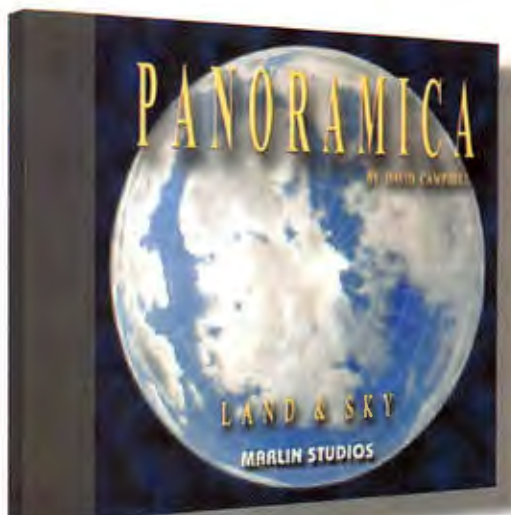


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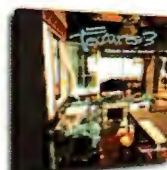
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Downtown Surfaces & Signs



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- > From Titanic to Time Machine – 3D sfx by Digital Domain
- > Tested: 10 of the best flatbed scanners

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COMPLETE REVIEWS GUIDE: 22 issues at a glance

hardware

PRODUCT	SUPPLIER	CONTACT	PRICE	VERDICT	ISSUE
ATI Radeon 64MBDDR VIVO	ATI Technologies	(011) 498 966 5150	£160	4.0	11
ELSA Gladiac 920	ELSA	+44 (0)800 563 445	£298	4.5	15
ELSA Gloria DCC	ELSA	+44 (0)800 563 445	£800	3.5	18
ELSA Gloria III	ELSA	+44 (0)800 563 445	£799	4.5	16
ELSA Synergy 2000	ELSA	+44 (0)800 563 445	£180	4.0	19
Fuji Finescan 2750	Creative Publishing Solutions	+44 (0)1242 285 100	£6,500	4.5	17
Gateway Solo 9300 XL	Gateway	+44 (0)800 973 132	£2,399	4.0	08
Geforce 2	Creative	+4 (0)800 973 069	\$299.99	4.0	04
[HardWare] Iomega MO 1.3	Iomega	+ 41 22 879 7000	£206-217. £15.99 per 1.3 GB cartridge	2.0	12
[HardWare] Iomega Peerless	Iomega	+ 41 22 879 7000	£117 (10GB USB bundle), £308.33 (20GB)	3.0	17
Iomega Predator CD/RW	Iomega	+ 41 22 879 7000	£192 (USB)	3.5	17
[HardWare] Jaz 2GB	Iomega	+ 41 22 879 7000	£229. £211 for 3.2 GB cartridges.	3.5	12
Max Black Storm3 K7 MP	Max Black	+44 (0)1763 245 757	£4,224	4.5	18
Minolta Vi-700	Minolta	+44 (0)1908 200 400	£16,500 / \$24,750 (ex VAT) (Platter extra £2,500 / \$3,750 (ex VAT))	3.0	05
Oxygen 420 Card	3D Labs	+44 (0)1784 470 555	\$2,099	4.0	09
Silicon Graphics 230	SGI	+44 (0)870 423 2243	£3,750	4.0	03
Voodoo 5500	3dfx	+44 (0)1753 502 800	\$299.99	2.5	04
Wacom Intuos 2 Tablet	Wacom	+44 (0)20 7744 0831	£354	4.5	22
Wacom PL500 Interactive Display	Wacom	+44 (0)20 8358 5858	\$3,999	2.0	11
WildCat II 5000	3Dlabs	www.3dlabs.com	£1,028	3.5	20
Wildcat II 5110	3Dlabs	+44 (0)1784 470 555	\$2,530	4.0	13
ZBrush	Pixologic	+1 888 748 5967	\$585	3.5	05
zBrush 1.23	Pixologic	+1 888 748 5967	£200	4.0	16
3D80XX S2	Reality Computing	+44 (0)1483 202051	£4,694	3.5	21

software

PRODUCT	SUPPLIER	CONTACT	PRICE	VERDICT	ISSUE
3ds max R4	Discreet	+44 (0)20 7851 8000	£2,695	4.5	10
Adobe Photoshop 6	Adobe Direct	+44 (0)131 458 6842	\$609	4.5	05
AlST Movie3D	HiSoft	+44 (0)1525 718181	£129	3.5	18
Amapi 3D 6	Computers Unlimited	+44 (0)20 8358 9235	\$399	3.5	14
Art*lanis 4.0	Gomark	+44 (0)20 7610 8686	£384	3.5	13
Aura 2	NewTek	+33 557 262 262	£510	4.5	10
Avatar Lab	Curious Labs	+001 831 462 8901	\$99	3.0	22
Axel 1.0	Mindavenue	+1 514 271 4774	£1,167	4.5	18
Bodypaint 3D	HiSoft	+44 (0)1525 718181	£395	4.5	08
Boujou 1.2	2d3 Ltd	+44 (0)1865 811061	\$10,000	4.5	17
Bryce 5	Computers Unlimited	+44 (0)20 8358 5857	£195	4.0	16
CacheForce ModelBank	CacheForce	+49 201 273 623	\$149 / \$449	3.0	19
Character Studio 3	Discreet	+44 (0)20 7851 8000	£995	4.5	08
CineLook	Polar Graphics	+44 (0)208 868 2476	£490	4.5	04
Cinema 4D Dynamics	Maxon	+44 (0)1525 718181	£329	4.5	18
Cinema 4D NET	HiSoft	+44 (0)1525 718 181	£86.38 / £629 / £1,497	4.0	06
Cinema 4D X 7	HiSoft	+44 (0)1525 718 181	£1,188	4.5	14
Cinema 4D XL6	HiSoft	+44 (0)1525 718 181	£1,187 / \$2,195	4.5	01
Combustion	st@ media	+44 (0)1483 549375	£2,295 / \$3,495	4.0	04
Cult3D	Cycore	+44 (0)20 8883 9330	\$500 p.a.	3.5	12
D Joiner	D Vision Works	+44 (0)1235 437 109	£300	3.5	20
D Sculptor	D Vision Works	+44 (0)1234 437 109	£500	4.0	11
Deep Paint 3D + Texture Weapons	Keoli	+44 (0)20 7482 4858	£995 ex VAT	4.0	05
DFX+	Zen Computer Services	+44 (0)905 94 4280	\$695	4.5	10
Digital Nature Tools for Maya 3.0	Graphics Domain Limited	+44 (0)20 7610 8686	£1,265 / £1,925	4.5	13
Director 8.5 Shockwave Studio	Computers Unlimited	+44 (0)20 8358 5857	£949	4.5	17
Dosch Design Texture CDs	HiSoft	+44 (0)1525 718181	£27.50	4.0	01
dvGarage Surface Toolkit Vol 1	dvGarage	+1 415 626 2400	£155	3.5	14
eFX Pyro 1.0	Electric Fx	+1 604 731 1820	£139	3.0	20
ElectricImage Universe	Gomark	+44 (0) 20 7610 8686	£1,388	4.0	15
ETShadPro R4/E	Expression Tools	info@expressiontools.com	\$1,399	3.0	16
Face Works	Puppet Works	+1 416 947 1881	\$4,995	4.0	6

software continued...

PRODUCT	SUPPLIER	CONTACT	PRICE	VERDICT	ISSUE
FILMBOX 3.0	Kaydara	+1 514 842 8446	£3,382	4.5	19
FILMBOX Studio 2.7	Kaydara	+1 514 842 3355	\$5,000 - \$30,000	4.5	11
Freeform	SensAble Technologies	+1 (781) 937 8315	\$21,450	4.5	2
Hash Animation: Master 8.5	Hash, Inc.	+1 360 750 0042	\$299	4.0	12
Houdini 4.0	Techimage	+44 (0)1367 253 868	£10,950	4.5	2
IBM Spaceball 4000	IBM	+44 (0)800 169 1460	£360	3.5	15
Illusions: the magic of pixels	Impulse, Inc.	+1 800 328 0184	\$299	4.0	12
Ispace	guildsoft	+44 (0)752 895 100	\$99	4.0	3
Kelseus Cloth	Kelseus Limited	+44 (0)1223 471 224	£399	4.0	14
LightWave 6	PAR Services	+44 (0)20 7439 3270	\$2,495	4.5	1
LightWave 3D 7	Gomark	+44 (0)20 7610 8686	£1,982	4.0	19
LightWave 6.5	Gomark	+44 (0)20 7731 7930	£1,599	4.5	7
Lunar Cell	Flaming Pear	+1612 253 8400	£14	3.5	9
Max Havok Pro	Havok	+1 650 322 2332	\$795	4.5	7
MaxPac 6000	Maxvision Corporation	+ (256) 772 3058	£4,825	4.0	13
Maya 3.0	Alias Wavefront	+44 (0)1494 441 273	\$16,000 / \$7,500 / \$2,995	4.5	1
Maya 3.0 for Linux	Alias Wavefront	+1 416 362 9181	£1,850 / £6,000 / £12,950	3.5	17
Maya 3.5 Mac	Alias Wavefront	+44 (0)1494 441 273	£6,360	4.0	20
Maya 4	Alias Wavefront	+44 (0)1494 441 273	£6,360 / £13,560 / £2,580	4.0	15
Medea Video Raid RT	Medea Corp	+44 (0)20 818 597 7645	£1,560 / \$2,495	4.0	1
Mental Ray Studio	Discreet	+44 (0)207 851 8000	£1,945 / £3,545	4.0	5
Merlin 3D	Digital Immersion Software	+1 705 522 7991	\$595	3.5	14
Messiah 1.5.5	PMG	+1 (323) 662 2480	\$695	4.0	8
MojoWorld Generator	Pandromeda	www.pandromeda.com	\$249	4.0	19
NatFX	Bionatics	+33 (0)149 691 220	\$2,400 (natFX Base); \$3,500 (natFX Ultimate)	4.0	21
NuGraf 4	Okino	+1 905 672 9328	\$395-\$495 (numerous bundles available)	4.0	21
Particle Storm 3.0 Napalm	Dynamic Realities	+1 702 990 2277	£280	4.0	16
PIXELS 3D 4.0	PIXELS 3D	www.pixels.net	\$599	3.5	22
PolyTrans	DCP	+49 402 540850	\$395	3.5	2
Poser Millennium Models	Zygote	+1 801 375 7220	\$59.95	3.5	6
Poser Pro Pack	Computers Unlimited	+1 831 462 8907	\$199	4.0	9
Pure	Advanced Rendering Technology	+44 (0)1223 563 854	£2,499	5.0	20
Pyrocluster	HiSoft	+44 (0)1525 718 181	£204	4.5	12
Quest3D	Act3D	+31 71 514 77 99	£174	3.5	20
Real Viz IPF	Graphic Domain Limited	+44 149 451 5500	\$5000 / £3,500 / \$800 / \$12,000	4.5	4
RealFlow 1.3	NextLimit	+44 (0)1444 232 000	\$595	4.0	2
RealSoft 3D 4	Realsoft Graphics	+358 3 471 8390	£432 / £216	4.0	7
RealWave	NextLimit	+44 (0)1444 232 000	\$245 (+\$500 for RealFlow)	4.0	2
Reelmotion 1.0.4	Motional Realms	+1 602 230 1300	\$795	4.5	3
Rhinoceros 2	Aztec CAD Ltd	+44 (0)20 7987 6453	£544	4.0	17
Sasquatch	Worley Laboratories	+1 650 322 7532	\$499	4.5	4
SceneGenie 1.2	IDBMedia	+1 415 495 3930	£660	4.5	2
SCS2	Cryonetworks	+44 (0)1625 539 494	£266	3.5	11
Shave and a Haircut	Safe Harbor	+1 800 480 5777	\$285	4.5	4
Smells like Almonds 1.2	HiSoft	+44 (0)1525 718 181	£62.50	3.5	1
Smells like Almonds 2	HiSoft	+44 (0)1525 718 181	£119 / \$150	5.0	6
Softimage XSI	Softimage	+44 (0)1753 655 999	(\$11,995 / \$7,995)	4.5	1
Softimage XSI 1.5	Softimage	+44 (0)753655999	£7,995 / £11,995	4.5	9
Softimage XSI 2.0	Tyrell	+44 (0)20 7343 5500	\$12,300 / \$8,200	4.5	19
solidThinking 4.1	Gomark	+44 (0)20 7731 7930	£1,737	3.5	9
Sony Vaio PCG F809K	Sony	+44 (0)990 424 424	£2,809	2.5	8
Stitch	digimotion	+1 504 468 7898	\$695	4.5	6
Stitcher 3: Mac	REALVIZ	+33 4 92 38 84 60	£568	5.0	17
Thinking Particles	Cebas	+49 6221 76 00 38	\$1,295	4.5	17
Thunder	Cubicspace Studios	www.plugin3d.com	£300	4.5	21
trueSpace 5	Guildsoft	+44 (0)1752 211 313	£655	4.0	11
Video Toaster	Graphic Domain Limited	+44 (0)494 515 500	£1,995	3.5	7
Viewpoint Model Library	Viewpoint Digital Ltd	+44 (0)1753 650104	\$5000 / \$10,000	4.5	19
VR4MAX	Tree C Technology	+31 (0)30 656 9600	\$2,200	4.5	21
Wacom Intuos	Wacom.com	+44 (0)20 341 5521	A3 £609, A4 £365	4.0	6
World Builder	Digital Element	+1 510 451 8020	£399 / \$999	4.0	20
World Construction Set 5	3DNature	+1 303 659 4028	\$995	4.0	13

COMPLETE REVIEWS GUIDE continued...

plug-ins

PRODUCT	SUPPLIER	CONTACT	PRICE	VERDICT	ISSUE
nEdge shaders	TripleD Tools	+1 505 332 3332	\$159	4.0	21
3d Studio Max Bunch of Volumes	Trinity 3D	+1800 548 1578	\$195	4.0	5
3d Studio Max finalRender	Stac Media Ltd	+44 (0)1483 688290	\$695	4.5	22
3d Studio Max Illustrate 4.1	Digimotion	+1 800 854 4496	£295 / \$395	4.0	3
3d Studio Max MatterWaves	Trinity 3D	+1800 548 1578	\$295	4.0	5
3d Studio Max Phoenix	Digimotion	+1 800 854 4496	£299 / \$395	4.0	3
3d Studio Max Pro-optic suite 1.31 vx	Trinity 3D	+1800 548 1578	£450 / \$595	4.5	3
3d Studio Max Quickdirt	Digimotion	+1 800 854 4496	£199 / \$245	4.0	3
3d Studio Max QuickTime VR	Trinity 3D	+1800 548 1578	\$150	4.0	5
3d Studio Max StairMax	Trinity 3D	+1800 548 1578	\$150	3.5	5
LightWave 3D LightNet 1.5	Komkom Doom	+32 92 342 215	FREE	4.0	3
LightWave 3D Project Messiah v1.54	Project: Messiah	+01 310 342 0077	£463 / \$695	4.0	3
LightWave 3D Relativity	Prem Subrahmanyam Graphic Design	+1 850 575 6051	£133 / \$200	4.0	3
LightWave 3D The James K Polk Collection	Worley Labs	+1 650 322 7532	£133 / \$199	4.5	3
LightWave Shadow Designer 1.1	Evasion	support@evasion-studio.com	£70	4.0	16
LightWave X-Def 1.0	Evasion	support@evasion-studio.com	£120	4.5	16
Maya Autonomous Character Plug-in V1.0	BioGraphic Technologies, Inc.	+1 514 844 5255	\$999	5.0	16
Maya Digital Naturetools 3.0	Tyrell Corporation	+44 (0)20 73 435 510	pluspack (£1,510 / \$2,995) original (£1,325 / \$1,995)	4.0	3
Maya Genesis 3.1	JMG Graphics	+33 (0)14 969 1220	£650/\$990 (database of 50 plants and a year's maintenance)		
			Additional Databases £500/\$750	4.0	3
Maya Modelling Poly Kit (MetaMesh Extreme+)	Phoenix Tools	+39 026 707 5747	Full \$1,000, 12-month \$275	4.5	3
Maya ReaFur	Phoenix Tools	+39 026 707 5747	Full \$1,600, 12-month \$400	3.5	3
Maya Titan	Poojyum	jagan@poojyum	\$99	4.0	16
MrsBebel	Konkeptoine	www.konkeptoine.com	\$150	4.0	21
Pixels3D Anvil SteamRoller	TripleD Tools	+1 505 332 3332	\$129	4.5	3
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Starship Troopers part 2

This month, we explore Sony Pictures Imageworks' substantial contribution to Paul Verhoeven's eviscerating sci-fi epic

BY MARK RAMSHAW

Last issue, we looked at the creature work by Tippett Studio, which turned the land battles of *Starship Troopers* into a visceral and entertaining splatterfest. This time, the focus is on Sony Pictures Imageworks, who provided the bulk of the space-bound effects sequences.

Working on 125 shots in all, the studio created arguably the finest space battle visuals in recent movie history, subtly integrating layers of physical model work and hundreds of computer effects to endow the scenes with breathtaking dramatic impact. The man co-ordinating the shots, Brian Keeney

at Sony Pictures Imageworks, remembers the process well: "I came to the show about four months after they'd started second unit photography, over at Culver Studios. They'd just returned from location shooting in South Dakota, and were starting to try to figure out all the massive CG needs. Our first job was to break down the storyboards and amass the information necessary to execute both the model photography and the CG elements – and then integrate them.

"Originally, Phil Tippett's company was set to handle the bugs, and Imageworks was tasked with the space shots," continues Brian. "But as the production continued, the shots grew in scope. Due to our limited size at the time, some work was contracted out to other facilities, mainly ILM and Boss Studios."

It was decided early on to opt for miniatures for the craft rather than CG models. "The scope of the scenes director Paul Verhoeven was describing, the interaction with all the fleets and the detail level they were looking for just wouldn't have been possible to produce at a sufficient quality with CG, even though

"MONEY ASIDE, IT WOULD PROBABLY BE BETTER TO DO THE SHIPS WITH CG NOW"

it was only five years ago. Miniatures were a proven technique, so we start a massive model-building effort. Similarly, CG pyro had, and still has its problems, so we were determined to shoot live pyro and composite that into the shots."

MODEL BEHAVIOUR

Of course, the term miniature is relative. The largest model was actually 18 feet long, with several 9-foot models companion pieces. Sony also constructed two massive model movers. When shooting the larger model, the camera generally moved while the ship remained static – until a scene which required the vessel to break in two: "There was a huge amount done digitally there,"

PEELING BACK THE LAYERS

"*Starship Troopers* was one of the biggest compositing jobs we've ever done," says Brian Keeney. "We shot 1,996 passes in all, averaging five to ten seconds, with 112 passes in one shot alone. On some passes, we were doing the traditional blue beauty pass, a black beauty pass, an engine pass, the main lighting pass, and then various plasma passes. In the final shots you can see that as the digital plasma goes past a ship it casts light, so that required an interactive pass. And there were also interactive explosion passes, so the pyros would also affect the lighting on a craft."

"It was a drawn-out process. Once we got the style down, a lot of the work just involved organising all the information, creating the previz, and then somehow organising the CG and massive miniature shoot."

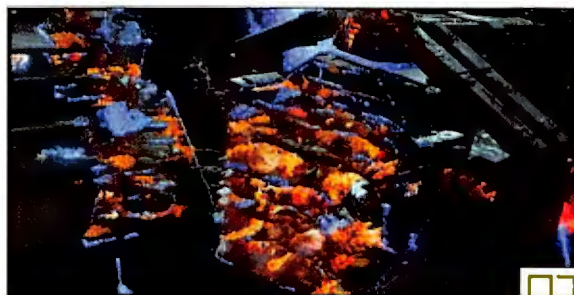
"We had close to 260 people working on the project, and around 90 artists at one point. We even had two pyro units working on it for six months. Paul was keen on explosions and effects in blue, orange and yellow – to suggest unfamiliar, futuristic chemicals, so the pyro guys had to spend a lot of time experimenting with powders and mixtures to achieve the right look. In all, we worked on it for close to a year."



Literally hundreds of model, live fire and digital model, particle and lighting effects are seamlessly integrated to produce the fantastic battle scenes in *Starship Troopers*.

[01] "We were scanning at 4K, putting pyro effects onto the decks, on pylons and throughout the ship," says Brian. "Scott [Anderson] would just keep adding more and more, layer upon layer to get it fully interactive."

[02] Plasma missiles are launched by the bugs down on the planet's surface, wreaking havoc on the fleet of carrier vessels up in orbit.



1997

FACT
FILE

PRODUCED BY Sony
Pictures Imageworks

**NUMBER OF
SONY PICTURES
IMAGWORKS SHOTS**
125

EMPLOYEES 350

CREDITS *Last Action Hero* (1993), *In The Line Of Fire* (1993), *Speed* (1994), *Wolf* (1994), *Johnny Mnemonic* (1995), *Die Hard With A Vengeance* (1995), *Money Train* (1995), *Phenomenon* (1996), *James And The Giant Peach* (1996), *Michael* (1996), *The Postman* (1997), *Anaconda* (1997), *Contact* (1997), *Godzilla* (1998), *City Of Angels* (1998), *Sphere* (1998), *Stuart Little* (1999), *Hollow Man* (2000), *What Lies Beneath* (2000), *Charlie's Angels* (2000), *Cast Away* (2001)

AWARDS Academy Award nominee for Best Visual Effects for *Hollow Man*, Academy Award for Best Visual Effects for *Stuart Little*, Academy Award nominee for Best Visual Effects for *Starship Troopers*

CONTACT 9050
West Washington Blvd.
Culver City, CA 90232
Web: www.imageworks.com

admits Brian. "We created the background with Dynamation, and for the planets we took the what were originally 2D painted elements, wrapped those around spheres, and then enhanced them with 3D shaders and other effects to give them dimension, an atmosphere and even reflections in the water."

The thrusters on all the craft were also computer-generated. For these, Imageworks developed displacement shaders, and then match-moved the CG to the rear of the ship models.

"We also created digital plasma," enthuses Brian. "That was Dynamation particle effect, further enhanced with our own lighting tool. The software is called BIRPS, and it enables us to bring in shaders and particle effects animations, then balance light values on the digital elements, ready for compositing."

For the plasma effects, it was necessary to stylistically match up with those created for the bugs by Tippet Studio some months earlier. A daylight plasma effect was also required, for sequences showing its launch from the surface of the planet up into space: "That took a little R&D to get right," adds Brian.

VIRTUAL VESSELS

Although the larger craft were real model miniatures, the smaller ships – such as tugs, personnel carriers and the like – were created entirely on computer. Imageworks used Alias software for modelling, and Wavefront TAV for animation. "Then we had *RenderMan* connected to our BIRPS system, with *Composer* as our main compositing tool, with some *Cineon* and *inferno*."

Softimage was used for previsualisation. "We did a whole lot of previz, and so were able to get a pipeline going, taking the previz information from *Softimage* and feeding it right into the model motion-control system."

But Brian is well aware of the technical improvements that have occurred since the mid-'90s. "My personal opinion is that, money aside, it would probably be better to do the ships with CG today. The techniques are definitely in place. But there's still the massive amount of pyro involved, and I think most people would shy away from doing that digitally."

Progress aside, what ultimately sets the battle sequences created by Sony Imageworks apart from their peers is the incredible attention to detail and air of realism. Where other sci-fi

movies feature small craft engaged in high-speed dogfights, *Starship Troopers'* scenes were dense to the point of claustrophobia, the massive warships loaded with inertia and breathtaking in scale.

Tellingly, just as Paul Verhoeven pictured the ground-based battles with Tippet Studio's bugs in terms of World War 2 movies, so he envisaged the space scenes as sci-fi updates of classic battles. "He wanted to see all those famous World War 2 battles, taking out in space," says Brian. "What with the scope of the space battles, then the cuts down to the planet with these bugs, it all works together to give the film one hell of an epic feel."

Starship Troopers is available to buy on DVD now.



Mark Ramshaw is a long-standing contributor to *3D World* and has contributed to many Future games and computer design magazines. Turn back to page 26 if you missed his in-depth history of 3D CG.



[03+04] "In the cockpit shots, there are about nine ships up in front, all with digitally created thrusters. We spent a long time getting the reflections onto the cockpit. And Paul was using lighting rigs on the set interior and actors, so we'd roto-scope that back out into a digital starfield with its miniatures and digital elements, choreographing off of the set lighting."



[05] "We did the pyro work over the space of three months, with outside night shoots, working with metal forms the same scale or size as the model ships, to get the flames following the contours of the model. Paul really wanted a high level of interactivity between the elements."



PIXELS 3D 3.7

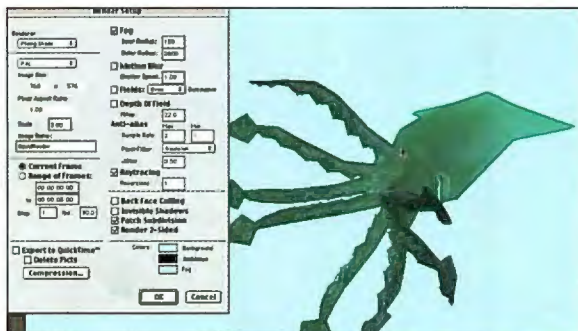
Full product
MAC only

This is the full version of the Mac community's favourite 3D application

Version 3.7 of this hugely popular Mac-only 3D application was, until recently, the most up-to-date iteration. But now version 4.0 is available to buy, we can bring you 3.7 in its entirety. Model objects, render them out –

and then animate the result; just check out the tutorial on page 52 to see how you can sculpt your own giant squid! Note that the first time you run the software, a registration screen will appear displaying your individual MachineID code. You need this to register online at store.pixels.net/reg37

CONTACT: www.pixels.net



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Demo
MAC only

Version 4 has many new features, including an open architecture, greatly improved NURBS modelling and new polygonal modelling. You'll also benefit from a revamped

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Before contacting us, please be sure to read the entry relating to the software you're trying to use. If you have a problem getting a program to run, contact our technical-support department using one of the following methods.

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- Web www.futurenet.co.uk/support
- fax +44 (0)1225 732279

- telephone +44 (0)1225 442244 (ext 2101)

At www.futurenet.co.uk/support you will find a list of frequently asked questions and solutions to common running problems reported for our coverdisc. This website is kept up-to-date and has links for downloading any material that might solve a potential problem.

Please e-mail our support team at the dedicated 3D World e-mail address quoted before trying to telephone. The lines can be very busy at times. We regret that due to

the complexity of the software on our CD we are unable to offer full support beyond installation queries.

WHAT IF I HAVE A FAULTY CD?

This is highly unusual, but if it's confirmed by our technical-support team please return your faulty disc to the following address and a free replacement will be with you within 28 days: Bluecrest International Ltd, Unit 6, Avenue 1, Station Lane Industrial Estate, Witney, OX8 6XZ, England.

Personal
Edition
PC only

Terragen

Create wonderfully atmospheric scenery.

This is the full, personal, non-commercial-use version of *Terragen*, which boasts the best atmospheric renderer we've ever seen. With it, you can sculpt fantastic scenery – and tweak many parameters, from the quality of the lighting to general atmospheric

conditions, including cloud effects. The software is free for personal non-commercial use. Registration is optional, but it does entitle you to additional benefits and removes the restriction on image size.

CONTACT: www.planetside.co.uk

Demo
PC Only

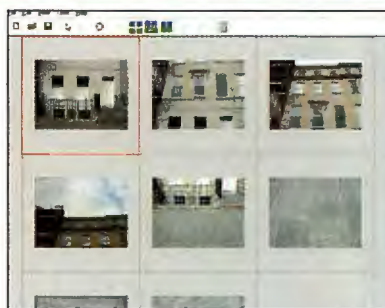
D Joiner

Stitch seamless 360-degree panoramas

This program enables you to create interactive panoramas by combining a series of photographs. There are three different modes to choose from: Cubic, Spherical and Cylindrical. Using the thumbnail mode, simply check photograph orientation – and then use

the marker mode to pick the points where the images overlap. Now select your output format and render the final result. It couldn't be simpler. This demo includes examples, found in a sub-directory of D Joiner.

CONTACT: www.d-vw.com



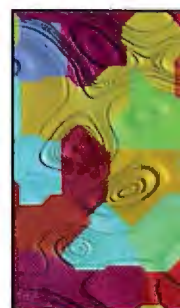
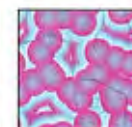
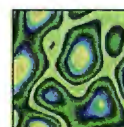
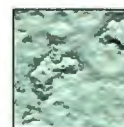
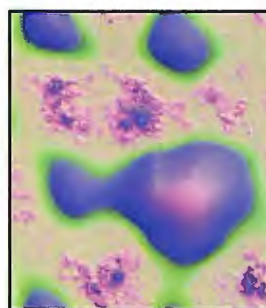
JPEG Format

Ground Zero software textures

Another 539 textures by Ground Zero Software

This is the second selection of rendered weird textures from Ground Zero Software's extensive collection. As with most textures, these can be applied to a great variety of objects and surfaces to help create interesting effects. They're all fully tileable and measure 256x256

pixels. You'll find the 539 textures in the Resources\Ground Zero folder on the disc. Your work will never be the same again, once wrapped in Ground Zero's idiosyncratic surfaces, so try them out. You're sure to find something you like!

Demo
PC Only

Digimation

A selection of 17 plug-ins for 3ds max 4

With the recent release of *Lume Tools Collection 1*, Digimation again stakes its claim as one of the leading producers of 3ds max plug-ins. So to celebrate we've decided to give away the demo versions of a choice variety of the company's

outstanding products. Included on this disc (among many others) are: *Lume Tools Collection 1*, *Bones Pro 3*, *Stitch*, *Morph-O-Matic*, *SeaScape*, *Stitch* and *Phoenix 1.5*.

CONTACT: www.digimation.com



EXHIBITIONIST

This issue's up-and-coming 3D artist in our Exhibitionist section is Marc Brink, with his *Blender-rendered movie Last Command*.
CONTACT: mail@marc-brink.com

EXHIBITION

A further collection of work from artists around the globe. Send your pics and you may appear next issue.
CONTACT: 3dw.exhibition@futurenet.co.uk

TUTORIALS

As usual, we bring you all the full-size screenshots and supporting files for this issue's tutorials and Q&A pages.

MOVIES

In the Inspiration section of the coverdisc, you'll find the trailer for *Astro Knights* from profiled UK firm Synthetic Dimensions.

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